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THIRTY-EIGHTH

ANNUAL REPORT

OF THE

Water Commissioners

TO THE

COMMON COUNCIL OF THE CITY OF TROY,

FOR THE

Fiscal Year Ended February 28th, 1893.

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ORGANIZATION OF THE BOARD.

COMMISSIONERS:

SAMUEL O. GLEASON, PRESIDENT.

——— ——— DENNIS J. WHELAN.

RICHARD F. HALL, DAVID C. BRIGGS.

Regular Meetings of the Board, Friday of each week, at 7:30 o'clock P. M.

GEORGE B. FALES, CLERK.

JOHN J. EVERS, ASSISTANT.

EDWARD DOLAN, SUPERINTENDENT.

JOHN H. GLEASON, ASSISTANT TO THE SUPERINTENDENT.

PROFESSOR WILLIAM P. MASON, M. D., CHEMIST.

AT PUMPING STATION, LANSINGBURGH.

SIFROID SOUCY, ENGINEER.

JOHN G. PRATT, ASSISTANT ENGINEER.

PATRICK MALONEY, ASSISTANT ENGINEER.

MICHAEL SULLIVAN, ASSISTANT ENGINEER.

JOHN H. GLEASON, KEEPER OF THE RESERVOIRS.

WATER COMMISSIONERS.

The following are the names of all who have served as Water Commissioners, together with the dates of their appointment, etc.

The first five were appointed by act of the Legislature, the ten following by the Common Council, and the last by this Board.

Name.	Appointed.	Resigned.	Died.
Harvey Smith,	Mar. 9, 1855.	Sept. 28, 1865.	Aug. 8, 1881.
William F. Sage,	" 9, 1855.	Oct. 2, 1862.	Oct. 22, 1870.
Thomas Symonds,	" 9, 1855.	.....	Dec. 22, 1876.
Joseph M. Warren,	" 9, 1855.	June 6, 1867.	.....
Liberty Gilbert,	" 9, 1855.	Sept. 28, 1865.	Mch 29, 1891.
Thomas Sausse,	Oct. 2, 1862.	.....	Nov. 13, 1871.
Lyman R. Avery,	Apr. 19, 1866.	Feb. 3, 1887.	Aug. 8, 1890.
Joseph Fales,	Apr. 19, 1866.	.....	Feb. 22, 1893.
Richard F. Hall.	Mar. 17, 1870.	.....	.....
Geo. D. Wotkyns,	Nov. 6, 1873.	.....	Nov. 17, 1880.
John B. Pierson,	Feb. 1, 1877.	.....	Aug. 12, 1885.
Henry S. Church,	Dec. 2, 1880.	Apr. 3, 1884.	.....
David M. Ranken,	May 6, 1884.	Oct. 3, 1890.	.....
Dennis J. Whelan,	Aug. 27, 1885.	.....	.....
Sam'l O. Gleason,	Feb. 3, 1887.	.....	.....
David C. Briggs,	Nov. 20, 1891.	.....	.....

REPORT OF THE COMMISSIONERS.

To the Honorable the Common Council of the City of Troy:

GENTLEMEN:—We present herewith to your honorable body our Thirty-eighth Annual Report, for the fiscal year ended February 28, 1893.

The Board organized at its regular meeting, April 1, by the election of Samuel O. Gleason, President, and George B. Fales, Clerk, for the ensuing year. Edward Dolan was nominated as Superintendent and appointed by your honorable body April 7. The change in the working force of the department has been the increase in help at the pumping station, upon the petition of employees, by the appointment of an assistant engineer, an oiler and two firemen, thus enabling three shifts of eight hours each to be made, instead of two of twelve hours each. This has resulted satisfactorily, and it is believed has added to the efficiency of this department of the service.

The only change in the membership of the Board during the year was occasioned by the death of Commissioner Joseph Fales, on the 22d of February. He was the senior member and was elected by the Common Council April 19, 1866. He was prominently identified with the municipal affairs of the city for upwards of a third of a century. Actively interested in all matters pertaining to the city, for many years past he devoted almost his entire time and attention, especially to the proper and satisfactory administration of this department of the city government. In questions affecting

the city's water supply and the cost of maintaining the department, he was an earnest and careful student and a wise and safe counselor. Regular in his attendance at the meetings of this Board, and thoroughly familiar with all the details of the department, his services and advice were invaluable. Possessed as he was of a genial and unselfish disposition, we shall miss his kindly greeting and shall always cherish in our hearts a feeling of high regard for the memory of our departed friend and associate.

By an amendment to the city charter it is provided that whenever the Common Council shall order any street to be paved, in the expense of which improvement the city at large is to share, it shall be the duty of the Water Commissioners, before such pavement shall be laid, forthwith to lay lateral pipe or pipes of proper size from the public mains in said street to the inside of the curb line fronting each lot or tract of land where such laterals are not already laid. In accordance with this amendment the Superintendent ascertained that the following streets were to be paved, and laterals were thereupon put in as follows: Congress street, 40; Adams street, 16; Division street, 6; Washington street, 3; Third street, 36; Seventh street, 9; Eighth street, 28; and Sixth avenue, 60. The total number of laterals put in was 321, of which 311 were by this department, 5 being of 4-inch and 2 6-inch iron pipe, and 10 by plumbers. Thirty permits were issued by the Superintendent to property owners for the opening of streets for the introduction and thawing out of laterals, upon filing the usual bond required by law.

The unusually large amount of work performed by the department in putting in laterals (321 in all), the expense attendant upon the lowering of mains and changing hydrants on account of new grades, and the

judgment against the city by Walter V. Wilson of $5,766.40, which we believe was wrongfully charged to the account of this department, have increased our maintenance account much above former years. A number of the laterals put in have already been paid for by the property owners, and all remaining unpaid August 1 next will be included and collected with the city water rents and will show in the receipts of the department for 1893.

The winter setting in with extremely cold weather and no snow on the ground, the frost penetrated deeply into the earth and caused more trouble by the freezing of laterals than has been experienced since the memorable winter of 1874-75. The mains, however, have escaped, with the exception of a 4-inch in President street, which was easily thawed out. The fire hydrants also suffered from the same cause and demanded constant care and attention. But it is a great satisfaction to know that these useful and important adjuncts have been found in every instance in good working order when their service was required by the Fire Department.

The rainfall during the past year was 34.83 inches, a trifle lower than the average. For the first eight months it was very evenly distributed, and in May, June, July and August was somewhat above the average, but in the four remaining months of the year aggregated only 5.79 inches, considerably less than one-half of the usual amount. For the last two years the customary and proverbial fall rains have failed to fill up our reservoirs and have left us at the approach of cold weather with a depleted and insufficient quantity of water on hand. In consequence of a limited amount of water in our storage reservoirs the gravity system could not aid the pumping supply, except for six days in March. Accordingly the pumps have been run 350 days continu-

ously, an average of 23 hours 43 minutes per day, and have stopped only for necessary repairs of the machinery and force main since last March. They pumped during the year 2,210,887,684 gallons, an average of 6,316,822 for each day they were in operation.

As was anticipated and predicted in our last report, the inadequate facilities of the present system for furnishing a full supply of water for the city have during the past year been brought to the knowledge of all our citizens. A scarcity approaching an actual famine menaced us for three or four months, and only by the most unceasing vigilance of this department and the somewhat tardy acquiescence and response of the people to our repeated warnings was the scanty supply made to last until rain and the melting snow and ice gave the much needed relief. That the use or abuse of water has outgrown the present means of furnishing it is a fact too patent to be gainsaid or disregarded. Fully impressed with this condition of things the Board deemed it unsafe and unwise to further delay action on so momentous a question and unanimously resolved to make investigation of the most thorough character in order to determine the best source for an immediate additional supply of water. Accordingly, on October 14, Professor William P. Mason, the chemist of the Board, was requested to make analyses of the waters of the Poestenkill, Quackenkill and the Hudson river, and later of the Snyder branch of the Poestenkill. His reports were presented to the Board on November 19 and January 27. On November 26 Professor William G. Raymond and Elnathan Sweet, ex-State Engineer, were appointed engineers for an additional water supply, and Commissioners Hall and Briggs were empowered to prepare a letter of instruction to them. Immediately upon the acceptance of their appointment they commenced their

labors, and placing two parties in charge of Engineers George Yost and M. R. Sherrerd, on the field work, completed their investigations in about three months. The report of Messrs. Sweet and Raymond, with accompanying maps, plans and estimates was submitted to the Board March 3, 1893, and will be found, together with Professor Mason's analyses of the waters, at the end of this report. An opportunity will thus be afforded for all interested to fully investigate and understand the details of this most important measure for the welfare of the city.

The distribution has been extended and mains laid during the year as follows, viz: In Monroe street, 157 feet 8-inch; at blow-off, Berger lane, 48 feet 8-inch; in Douw street, 247 feet 6-inch; in North Fourth street, 1,658 feet 24-inch; in Front street, 143 feet 6-inch; in Tyler street, 140 feet 8-inch and 288 feet 6-inch; in Van Buren street, 252 feet 6-inch and 27 feet 4-inch; in Kelly street, 230 feet 6-inch; in Cross street, 425 feet 6-inch; in Harrison place, 753 feet 6-inch, replacing 4-inch and 3-inch pipe; in Jefferson street, 345 feet 6-inch; in Congress street, 65 feet 12-inch; making altogether an aggregate of 4,778 feet of new mains laid, exclusive of 4-inch hydrant laterals (255 feet) as follows:

24-inch	1,658 feet.
12-inch	65 feet.
8-inch	345 feet.
6-inch	2,683 feet.
4-inch	27 feet.
Total	4,778 feet.

The total length of all the pipe laid to date throughout the works is $57\frac{3685}{5280}$ miles.

Two hundred and thirty-seven meters, in sizes ranging from ¾-inch to 6-inches, are now in use and are

giving general satisfaction. The quantity of water registered by meters for the year was 357,121,000 gallons.

Nineteen fire hydrants and thirty-five valves were put in, of which thirteen were on old work. There are now in use 717 fire hydrants and 1,142 valves. The total cost of the mains laid and relaid, with hydrants and valves, was $10,951.99. For other information and details in statistics, relating to both branches of the Department's service, we would refer your honorable body to the Superintendent's report presented herewith.

A brief general statement of the financial condition of the Department is presented as follows:

Balance on hand March 1, 1892	$35,723 86	
Regular water rents for 1892	66,480 02	
Collected by the Clerk	27,030 84	
Total resources for the year		$129,234 72
Paid interest on debt	$13,885 00	
" sinking fund	17,925 00	
" for construction	10,951 99	
" general purposes	59,368 06	
Total payments		102,130 05
Showing balance on hand March 1, 1893		$27,104 67

The bonded debt of the city on account of its water works is at present $341,000.

The amount in the sinking fund, after charging it with interest and bonds paid to date, is $36,437.50

The amounts collected by the Clerk for the year have, as required by law, been paid to the Chamberlain, as per receipts on file, as follows:

April 2, 1892	$1,161 28	
May 5, "	816 85	
June 2, "	3,863 51	
July 6, "	1,709 94	
Aug. 8, "	2,376 67	
Sept. 3, "	2,949 13	
Oct. 6, "	2,261 03	
Nov. 5, "	1,282 87	
Dec. 3, "	3,005 91	
Jan. 4, 1893	1,664 06	
Feb. 3, "	3,544 49	
28, "	2,395 10	
Total		$27.030 84

The following summary of ledger balances will explain in detail the year's receipts and expenditures:

Dr.

Folio.			
3.	Cash account	$27,104 67	
8.	Shop tools account	249 58	
9.	Pumping station—supplies account	253 93	
10.	" " —tools account	173 46	
14.	" " —oil account	339 91	
25.	Damages and rebate account	5,771 40	
29.	Meter account	307 39	
33.	Pumping station—coal account	9,867 89	
35.	Lead pipe account	2,127 00	
36.	Iron pipe account	6,675 49	
37.	Printing and advertising account	253 00	
38.	Coal account, shop and office	112 80	
41.	Shop pay roll account	4,308 71	
44.	Maintenance account, miscellaneous bills	4,631 57	
52.	Pumping station—boilers account	2,177 79	
54.	Office expenses	201 41	
56.	Shop supplies account	2,764 37	
58.	Pumping station—pay roll account	10,328 81	
60.	Stable expenses	828 07	
62.	Office pay roll account	3,900 00	
64.	Chamberlain City of Troy	27,030 84	
68.	Construction account	10,951 99	
70.	Pumping station—gas account	617 25	
76.	Reservoir account	208 39	
78.	Valves and hydrants account	1,815 36	
82.	Pumping station—engines account	706 73	
84.	Pumping station—buildings and grounds account	747 75	
332.	Interest account	13,885 00	
333.	Sinking fund account	17,925 00	
			$156,265 56

Cr.

Folio.			
7.	Special tax account—special taxes	$ 707 00	
32.	Water rents account	66,480 02	
46.	Shop work account,	8,051 31	
48.	Special tax account—sewing machine motors	411 50	
50.	Special tax account—meters	16,048 69	
66.	Office receipts	27,030 84	
72.	Special tax account—street sprinkling	1,275 00	
74.	" " " —masons' uses	519 34	
80.	Stable tenements account	18 00	
42.	Cash balance	35,723 86	
			$156,265 56

INCOME.

THE FOLLOWING IS A DETAILED STATEMENT OF THE INCOME FOR THE YEAR ENDED FEBRUARY 28TH, 1893:

From the annual assessed water rents collected with the city taxes by the Chamberlain, viz:

In First District	$20,397 95	
In Second District	19,956 82	
In Third District	26,125 25	
		$66,480 02
From amounts collected by the Clerk and by him paid over to the Chamberlain, viz:		
For use of water, sprinkling streets with small hose	$1,275 00	
For water used by county buildings, schools, churches and other buildings, by special and meter rates	16,755 69	
For water for masons' uses	519 34	
For water used by sewing machine motors	411 50	
For job work and sales of material	8,051 31	
		$27,030 84
Total		$93,510 86
NOTE—Annual water rents, 1892, as above		$66,480 02
Annual water rents, 1891:		
First District	$20,047 66	
Second District	19,629 62	
Third District	25,662 69	
		$65,339 97
Increase of rents over 1891		$1,140 05

The foregoing table indicates an increase of $1,140.05 in the amount of the regular water rents for 1892, as

compared with the amount for the preceding year. Included in the water rents were the charges for unpaid lateral bills amounting to $1,441.85. The actual increase in the water rents was $655.97. In premises where the supply is metered, only the building rate appears on the water rent books, the bills for water as rendered quarterly being payable at the office.

EXPENDITURES.

The payments for the fiscal year ended February 28, 1893 ($102,130,05,) are included in the following detailed monthly statements thereof :

March, 1892.

No. of Voucher.		Amount.
1.	Monthly Pay Roll, Feb'y—office account	$325 00
1.	" " " —maintenance account	75 00
2.	Weekly " Feb'y 27—maintenance account	107 12
2.	" " " —shop account	13 38
2.	" " " —P. S. boilers account	36 30
2.	" " " —P. S. account	156 70
3.	" " March 5—maintenance account	120 87
3.	" " " —shop account	14 00
3.	" " " —P. S. account	156 70
4.	" " " 12—maintenance account	149 25
4.	" " " —shop account	30 75
4.	" " " —P. S. account	156 70
5.	" " " 19—maintenance account	119 00
5.	" " " —shop account	22 00
5.	" " " —P. S. boilers account	36 30
5.	" " " —P. S. account	152 95
6.	Bayer & McConihe, lumber	21 70
7.	Edward Dolan, Supt., one quarter's salary	500 00
8.	James Corr, shoeing	6 00
9.	C. F. Murnane, oats	23 15
10.	H. G. Van Valkenburgh, hay	22 54
11.	McCormick & Dunn, supplies	35 85
12.	Troy Gas Company, gas at office	5 70
13.	Mrs. C. A. Bounds, care of office	9 00
14.	H. R. Worthington, meter repairs	12 85
15.	Charles Barber, charcoal	24 00
16.	J. M. Warren & Co., lead pipe	17 26

17.	Torrance & Co., iron spouts	$	11 70
18.	Ludlow Valve Co., valves and hydrants		62 50
19.	William Kemp & Son, bronze castings		9 10
20.	Troy Gas Company, gas at P. S		67 35
	Total	$2,500	72

April, 1892.

21.	Monthly Pay Roll, March—maintenance account	$	75 00
21.	" " " —office account		325 00
22.	Weekly " " 26—maintenance account		139 38
22.	" " " —shop account		18 75
22.	" " " —P. S. account		156 70
22.	" " " —P. S. boilers account		36 30
23.	" " April 2—maintenance account		124 37
23.	" " " —shop account		64 45
23.	" " " —P. S. account		156 70
23.	" " " —P. S. boilers account		36 30
24.	" " " 9—maintenance account		127 80
24.	" " " —construction account		12 93
24.	" " " —shop account		47 02
24.	" " " —P. S. account		156 70
24.	" " " —P. S. boilers account		30 25
25.	" " " 16—maintenance account		144 38
25.	" " " —construction account		96 00
25.	" " " —shop account		44 98
25.	" " " —P. S. account		161 70
26.	" " " 23—maintenance account		129 50
26.	" " " —construction account		112 50
26.	" " " —shop account		34 55
26.	" " " —P. S. account		156 70
27.	Geo. B. Fales, clerk, disbursements		17 15
28.	Troy Telephone Co., rent telephones		65 50
29.	W. J. Noonan, supplies		301 67
30.	McLeod & Henry Co., fire brick		17 50
31.	James Corr, shoeing		7 50
32.	C. F. Murnane, oats		20 25
33.	H. G. Van Valkenburgh, hay		17 76
34.	T. Godson & Son, harness and repairs		49 25
35.	L. B. Magill, supplies		114 81
36.	Edward J. Hayes, repairs		1 35

37.	Mrs. C. A. Bounds, care of office	$ 9 00
38.	Troy Gas Company, gas at office	4 05
39.	Adams Laundry Machinery Co., engine repairs	29 54
40.	Holly M'f'g Co., engine repairs	150 01
41.	Emil Lecomte, trees at P. S.	37 25
42.	Fire Commissioners, old hose	25 00
43.	Thomson Meter Co., 1 3-inch meter	101 25
44.	Troy Gas Company, gas at P. S.	57 75
	Total	$3,414 55

May, 1892.

45.	Monthly Pay Roll, April —construction account	$ 75 00
45.	" " " —office account	325 00
46.	Weekly " " 30—maintenance account	133 48
46.	" " " —construction account	116 00
46.	" " " —shop account	25 77
46.	" " " —P. S. account	156 70
47.	" " May 7—maintenance account	130 85
47.	" " " —construction account	168 77
47.	" " " —shop account	60 83
47.	" " " —P. S. account	156 70
47.	" " " —P. S. boilers account	52 50
48.	" " " 14—maintenance account	149 43
48.	" " " —construction account	183 20
48.	" " " —shop account	47 78
48.	" " " —P. S. account	161 70
48.	" " " —P. S. Boilers account	18 15
49.	" " May 21—maintenance account	147 10
49.	" " " —construction account	173 52
49.	" " " —shop account	63 70
49.	" " " —P. S. account	165 45
49.	" " " —P. S. Boilers account	6 05
50.	McCormick & Dunn, supplies	78 24
51.	William Donovan, sand	5 00
52.	J. M. Warren & Co., pig lead	870 13
53.	W. J. Noonan, supplies	94 86
54.	Adams Laundry Machinery Co., engine supplies	21 20
55.	McLeod & Henry Co., fire brick	17 60
56.	Franklin Iron Works, boiler repairs	5 65

57.	John Butler, blacksmithing	$	4 50
58.	James Corr, shoeing		7 00
59.	H. G. Van Valkenburgh, hay		21 40
60.	Fogarty Wagon Works, repairs		41 85
61.	Troy Gas Co., gas at P. S		53 85
62.	Mrs. C. A. Bounds, care of office		9 00
63.	Troy Gas Co., gas at office		4 05
64.	A. Meekin & Co., printing		14 50
65.	J. M. Warren & Co., wire rope		5 50
66.	Ludlow Valve Co., 4-inch valve		8 50
67.	M. Mahony, castings		149 10
68.	Richard Carter, Jr., hydrant posts		75 00
69.	Ludlow Valve Co., valves and hydrants		331 01
70.	Charles McManus, cartage		196 22
71.	R. D. Wood & Co., iron pipe		4,866 44
72.	H. R. Worthington, meter repairs		3 42
73.	J. M. Warren & Co., lead pipe		1,763 58
74.	D. Judson, coal for P. S		177 02
	Total	$	11,342 30

June, 1892.

75.	Monthly Pay Roll, May —construction account	$	75 00
75.	" " " —office account		325 00
76.	Weekly " " 28—maintenance account		137 30
76.	" " " —construction account		239 39
76.	" " " —shop account		72 00
76.	" " " —P. S. account		156 70
76.	" " " —P. S. boilers account		35 30
77.	" " June 4—maintenance account		144 18
77.	" " " —construction account		178 35
77.	" " " —shop account		72 20
77.	" " " —P. S. account		159 20
78.	" " " 11—maintenance account		186 30
78.	" " " —construction account		26 00
78.	" " " —shop account		128 66
78.	" " " —P. S. account		166 70
78.	" " " —P. S. boilers account		60 60
79.	" " " 18—maintenance account		168 90
79.	" " " —shop account		187 82

79.	Weekly Pay Roll, June 18—P. S. account	$ 172 70
79.	" " " —P. S. boilers account	43 38
80.	McCormick & Dunn, supplies	51 26
81.	Martin Hunt, stone	54 25
82.	Crandell, Knight & Reichard, office coal and cement	113 20
83.	D. F. Magill, supplies	48 04
84.	Geo. B. Fales, clerk, disbursements	44 57
85.	William Donovan, sand	5 00
86.	Edward Dolan, Supt., 1 quarter's salary	500 00
87.	H. B. Nims & Co., supplies	8 23
88.	Troy Telegram, paper one year	7 80
89.	Troy Gas Company, gas at office	2 85
90.	Mrs. C. A. Bounds, care of office	9 00
91.	James Corr, shoeing	6 00
92.	Fogarty Wagon Works, repairs	18 80
93.	H. G. Van Valkenburgh, hay	31 20
94.	C. F. Murnane, oats	17 93
95.	Charles Carr, rubber packing	5 00
96.	W. J. Noonan, supplies	307 18
97.	M. Mahony, castings	423 03
98.	T. Crowley, work at reservoir	27 50
99.	Wales & Crane, painting at reservoir house	35 00
100.	National Meter Co., meters	128 00
101.	Troy Gas Co., gas at P. S	44 55
102.	Eddy Valve Co., valves	281 00
103.	Crandell, Knight & Reichard, coal for P. S	1,866 50
	Total	$6,771 57

July, 1892.

104.	Monthly Pay Roll, June —shop account	$ 75 00
104.	" " " —office account	325 00
105.	Weekly " " 25—maintenance account	159 15
105.	" " " —shop account	276 75
105.	" " " —P. S. account	156 70
106.	" " July 2—maintenance account	138 75
106.	" " " —construction account	66 25
106.	" " " —shop account	165 25
106.	" " " —P. S. account	156 70
107.	" " " 9—maintenance account	120 25

107.	Weekly Pay Roll, July 9—construction account.	$ 36 75
107.	" " " —shop account.....	216 74
107.	" " " —P. S. account :.....	156 70
107.	" " " —P. S. boilers account.	21 18
108.	" " " 16—maintenance account.	146 50
108.	" " " —shop account..,.....	247 40
108.	" " " —P. S. account.....	156 70
108.	" " " —P. S. boilers account.	36 30
109.	" " " 23—maintenance account.	141 15
109.	" " " —construction account.	2 00
109.	" " " —shop account.....	282 45
109.	" " " —P. S. account.....	155 20
109.	" " " —P. S. boilers account.	34 30
110.	George B. Fales, clerk, disbursements.....	13 05
111.	Wm. Donovan, sand.....	5 00
112.	Troy Steel & Iron Co., ashes.....	6 00
113.	Troy Telephone Co., rent telephones.....	65 50
114.	Crandell, Knight & Reichard, coke.....	77 97
115.	T. H. Bowditch, blacksmithing.....	36 02
116.	Bayer & McConihe, lumber.....	64 83
117.	Mrs. C. A. Bounds, care of office.....	9 00
118.	Troy Gas Co., gas at office.....	2 70
119.	McCormick & Dunn, supplies.....	31 24
120.	McLeod & Henry Co., fire brick.....	63 70
121.	Troy Belting & Supply Co., supplies.....	50 20
122.	James Corr, shoeing.....	7 00
123.	C. F. Murnane, oats.....	23 40
124.	T. Godson & Son, repairs.....	17 50
125.	Troy Gas Co., gas at P. S.....	35 40
126.	J. M. King & Co., taps.....	26 50
127.	W. J. Noonan, supplies.....	648 48
128.	Eddy Valve Co., valves.....	74 00
129.	Charles Barber, charcoal.....	25 20
130.	M. Mahony, castings.....	314 28
131.	George Wheeler, repairs at P. S.....	45 50
132.	J. J. Abbott, supplies.....	22 78
133.	J. M. Francis & Son, printing annual report.....	210 30
134.	Crandell, Knight & Reichard, coal for P. S.....	2,078 07
	Total.....	$7,226 79

August, 1892.

135.	Monthly Pay Roll, July, —shop account	$ 75	00
135.	" " " —office account	325	00
136.	Weekly " " 30—maintenance account.	169	75
136.	" " " —shop account	244	40
136.	" " " —P. S. account	156	70
136.	" " " —P. S. boilers account	24	20
137.	" " Aug. 6—maintenance account.	178	15
137.	" " " —construction account.	38	92
137.	" " " —shop account	63	53
138.	" " " 13—maintenance account.	161	30
138.	" " " —construction account.	87	15
138.	" " " —shop account	49	20
138.	" " " —P. S. account	14	63
139.	" " " 20—maintenance account.	189	95
139.	" " " —construction account.	60	50
139.	" " " —shop account	58	35
139.	" " " —P. S, account	9	00
140.	George B. Fales, clerk, disbursements	34	55
141.	Schaghticoke Powder Co., fuses	3	54
142.	McLeod & Henry Co., fire brick	40	00
143.	Richard Whelan, paving blocks	28	50
144.	James Corr, shoeing	6	00
145.	H. G. Van Valkenburgh, hay	19	71
146.	C. F. Murnane, oats	20	70
147.	Wm. Donovan, sand	5	00
148.	Ludlow Valve Co., wash hydrants	43	29
149.	W. J, Noonan, supplies	58	56
150.	M. Mahony, castings	155	13
151.	Mrs. C. A. Bounds, care of office	9	00
152.	Lee Chamberlin, iron pipe	43	10
153.	R. D. Wood & Co., iron pipe	300	23
154.	Adams Laundry Machinery Co., repairs	7	39
155.	J. M. Warren & Co., wire rope	20	78
156.	Bergmann Bros., carpenter work at P. S	21	20
157.	George Wheeler, repairs at P. S	23	95
158.	Charles D. Clark, painting dwelling at P. S	246	00
	Total	$2,992	36

September, 1892.

159.	Monthly Pay Roll, Aug.	—maintenance account.	$ 75 60
159.	" " "	—office account	325 00
159.	" " "	—P. S. account	911 00
159.	" " "	—P. S. boilers account.	93 95
160.	Weekly "	" 27—maintenance account	219 63
160.	" " "	—shop account	58 62
160.	" " "	—P. S. account	9 00
161.	" "	Sept. 3—maintenance account.	241 75
161.	" "	—shop account	71 55
161.	" "	—P. S. account	9 00
162.	" "	" 10—maintenance account.	240 45
162.	" "	—shop account	35 00
162.	" "	—P. S. account	9 00
163.	" "	" 17—maintenance account.	167 95
163.	" "	—shop account	71 70
163.	" "	—P. S. account	9 00
164.	Edward Dolan, 1 quarter's salary, Supt		500 00
165.	George B. Fales, clerk, disbursements		13 81
166.	L. B. Magill, supplies		118 51
167.	John J. Hanley, boiler compound		96 75
168.	Troy Belting & Supply Co., supplies		53 80
169.	W. J. Noonan, supplies		30 22
170.	George Wheeler, engine supplies		10 54
171.	McCormick & Dunn, supplies		102 53
172.	E. Lecomte, bedding plants P. S		55 00
173.	James Corr, shoeing		7 50
174.	C. F. Murnane, oats		23 25
175.	Fogarty Wagon Works, repairs		4 68
176.	H. G. Van Valkenburgh, hay		24 53
177.	National Meter Co., meter pistons		20 50
178.	Mrs. C. A. Bounds, care of office		9 00
179.	Troy Gas Company, gas at office		4 50
180.	D. Klock, Jr., & Co., rubber boots		10 00
181.	Charles Barber, charcoal		26 50
182.	M. Mahony, castings		59 73
183.	Eddy Valve Co., valves and hydrants		200 00
184.	Troy Gas Co., gas at P. S		78 00
185.	J. M. Francis & Son, advertising		8 00
186.	C. L. Mac Arthur & Son, advertising		13 70
187.	J. M. Warren & Co., lead pipe		289 40
	Total		$4,308 05

October, 1892.

188.	Monthly Pay Roll,	Sept.	—maintenance account.	$ 75	00
188.	" "	"	—office account.....	325	00
189.	Weekly "	"	24—maintenance account.	193	15
189.	" "	"	—shop account.....	82	97
189.	" "	"	—P. S. account.....	9	00
190.	" "	Oct.	1—maintenance account.	226	93
190.	" "	"	—construction account.	55	20
190.	" "	"	—shop account	33	87
190.	" "	"	—P. S. account.....	9	00
191.	" "	"	8—maintenance account.	243	00
191.	" "	"	—construction account.	87	35
191.	" "	"	—shop account.....	47	77
191.	" "	"	—P. S. account.....	9	00
192.	" "	"	15—maintenance account.	232	60
192.	" "	"	—construction account.	128	35
192.	" "	"	—shop account.....	30	75
192.	" "	"	—P. S. account.....	9	00
193.	" "	"	22—maintenance account.	229	38
193.	" "	"	—construction account.	128	22
193.	" "	"	—shop account.....	27	90
193.	" "	"	—P. S. account.....	9	00
194.	Monthly "	Sept.	—P. S. account.....	924	19
194.	" "	"	—P. S. boilers account.	57	48
195.	George B. Fales, clerk, disbursements.....			17	35
196.	Wm. Donovan, sand and teaming.....			13	00
197.	H. B. Nims & Co., supplies.....			10	68
198.	Michael Madden, 1 cord wood			6	50
199.	Troy Telephone Co., rent telephones.....			65	90
200.	McCormick & Dunn, supplies.....			59	31
201.	James Corr, shoeing.....			6	25
202.	Fogarty Wagon Works, repairs.....			20	25
203.	H. G. Van Valkenburgh, hay.....			20	11
204.	C. F. Murnane, oats.....			20	70
205.	Joel Jaquins, supplies.....			3	38
206.	Charles Marks, cleaning vault, reservoir.....			25	00
207.	Crandell, Knight & Reichard, coal and cement...			3,647	79
208.	W. J. Noonan, supplies.....			21	89
209.	J. L. Pine Co., supplies			10	35
210.	Knowlson & Kelley, engine repairs.....			61	40
211.	L. Katzenstein & Co., metallic packing.....			29	40
212.	Adams Laundry Machinery Co., repairs.....			25	57

213.	Knowlson & Kelley, P. S. tools	$ 12	30
214.	J. J. Abbott, repairs	14	35
215.	Troy Gas Co., gas at office	2	55
216.	Mrs. C. A. Bounds, care of office	9	00
217.	Thomson Meter Co., one 1-inch meter	19	90
218.	Troy Gas Co., gas at P. S	50	70
219.	Eddy Valve Co., supplies	27	90
220.	R. D. Wood & Co., 6-inch pipe and specials	556	00
—	Bonds of May, 1879, interest to Nov. 1, 1892	$2,750	00
—	Bonds of August, 1879, interest to Aug. 1, 1892	3 150	00
—	Bonds of April, 1880, interest to April 1, 1893	1,925	00
—	Bonds of August, 1881, interest to Aug. 1, 1893	1,400	00
—	Bonds of May, 1883, interest to Nov. 1, 1892	1,750	00
—	Bonds of June, 1884, interest to Dec. 1, 1892	2,000	00
—	Bonds of November, 1885, interest to Nov. 1, 1892	910	00
—	Bonds of May, 1879, annual sinking fund payment	4,000	00
—	Bonds of August, 1879, annual sinking fund payment	3,850	00
—	Bonds of April, 1880, annual sinking fund payment	5,075	00
—	Bonds of August, 1881, annual sinking fund payment	5,000	00
	Total	$39,738	64

November, 1892.

221.	Monthly Pay Roll,	Oct.	—construction account.	$ 75	00
221.	" "	"	—office account	325	00
222.	Weekly "	" 29	—maintenance account.	162	05
222.	" "	"	—construction account.	167	42
222.	" "	"	—shop account	36	13
222.	" "	"	—P. S. account	7	50
223.	" "	Nov. 5	—maintenance account.	182	62
223.	" "	"	—construction account.	22	50
223.	" "	"	—shop account	91	50
223.	" "	"	—P. S. account	9	00
224.	Monthly "	Oct. 31	—P. S. account	910	00
224.	" "	"	—P. S. boilers account.	4	55
225.	Weekly "	Nov. 12	—maintenance account.	155	90

225.	Weekly Pay Roll, Nov. 12—shop account	$ 73	50
225.	" " " —P. S. account	9	00
225.	" " " —P. S. boilers account	44	55
226.	" " Nov. 19—maintenance account	198	55
226.	" " " —shop account	93	75
226.	" " " —P. S. account	10	12
227.	Charles R. Painton, brick and sand	10	00
228.	George B. Fales, clerk, disbursements	37	86
229.	D. F. Magill, supplies	75	94
230.	James Corr, shoeing	9	00
231.	T. Godson & Son, supplies	41	60
232.	Fogarty Wagon Works, repairs	16	15
233.	H. G. Van Valkenburgh, hay	22	42
234.	C. F. Murnane, oats	24	75
235.	Troy Gas Co., gas at office	3	00
236.	Mrs. C. A. Bounds, care of office	9	00
237.	R. D. Wood & Co., iron pipe	372	23
238.	Clary Bros., blacksmithing	3	25
239.	Eddy Valve Co., valves and hydrants	149	00
240.	Ludlow Valve Co., valves and hydrants	214	80
241.	National Meter Co., repairs	7	75
242.	W. J. Noonan, supplies	75	60
243.	Crandell, Knight & Reichard, coal and cement	781	65
244.	Troy Gas Co., gas at pumping station	50	10
245.	W. V. Wilson, damages	5,766	40
	Total	$10,249	14

December, 1892.

246.	Monthly Pay Roll, Nov., —maintenance account	$ 27	50
246.	" " " —construction account	5	00
246.	" " " —shop account	42	50
246.	" " " —P. S. account	914	90
246.	" " " —P. S., boiler account	82	55
246.	" " " —office account	325	00
247.	Weekly " " 26—maintenance account	171	20
247.	" " " —shop account	74	75
247.	" " " —P. S. account	4	50
248.	" " Dec. 3—maintenance account	188	20
248.	" " " —construction account	3	60

248.	Weekly Pay Roll, Dec. 3—shop account	$ 67 25
248.	" " " —P. S. account	9 00
249.	" " " 10—maintenance account	130 05
249.	" " " —shop account	40 07
249.	" " " —P. S. account	9 00
250.	" " " 17—maintenance account	125 40
250.	" " " —shop account	72 62
250.	" " " —P. S. account	9 00
251.	" " " 24—maintenance account	147 00
251.	" " " —shop account	18 75
251.	" " " —P. S. account	10 87
252.	Troy Telephone Co., rent telephones	65 50
253.	Troy Public Works Co., spruce plank	8 00
254.	Edward Dolan, one quarter's salary, Supt	500 00
255.	George Wheeler, repairing heater	4 98
256.	George B. Fales, clerk, disbursements	22 37
257.	Neemes Bros., castings	12 70
258.	McLeod & Henry Co., fire brick	24 50
259.	James Corr, shoeing	8 00
260.	C. F. Murnane, oats	25 95
261.	H. G. Van Valkenburgh, hay	23 16
262.	Edward Lee, plumbing	2 00
263.	W. J. Noonan, supplies	67 04
264.	M. Mahony, castings	144 75
265.	McCormick & Dunn, supplies	26 92
266.	L. S. Bunnell, repairs	11 28
267.	Charles D. Clark, painting at P. S.	4 93
268.	J. J. Abbott, repairs	13 65
269.	J. M. Warren & Co., lead pipe	78 75
270.	J. L. Pine Co., supplies	16 10
271.	T. H. Bowditch, blacksmithing	4 32
272.	Mrs. C. A. Bounds, care of office	9 00
273.	Troy Gas Co., gas at office	4 95
274.	Troy Gas Co., gas at P. S.	52 20
275.	Eddy Valve Co., one 10-inch valve	27 50
276.	R. D. Wood & Co., 6-inch bends	158 61
277.	Charles McManus, teaming	80 86
278.	Crandell, Knight & Reichard, P. S. coal	1,339 86
	Total	$5,216 59

January, 1893.

279.	Monthly Pay Roll, Dec.			—maintenance account.	$	75 00
279.	"	"	"	—office account		325 00
279.	"	"	"	—P. S. account		890 00
279.	"	"	"	—P. S. boilers account		78 70
280.	Weekly	"	" 31	—maintenance account.		107 60
280.	"	"	"	—shop account		25 00
280.	"	"	"	—P. S. account		9 00
280.	"	"	"	—P. S. boilers account		12 10
281.	"	"	Jan. 7	—maintenance account.		107 45
281.	"	"	"	—shop account		37 92
281.	"	"	"	—P. S. account		4 50
281.	"	"	"	—P. S. boilers account		34 30
282.	"	"	Jan. 14	—maintenance account		129 52
282.	"	"	"	—shop account		43 50
282.	"	"	"	—P. S. account		9 00
282.	"	"	"	—P. S. boilers account		16 15
283.	"	"	" 21	—maintenance account		112 75
283.	"	"	"	—construction account		45 35
283.	"	"	"	—shop account		35 56
283.	"	"	"	—P. S. account		9 00
283.	"	"	"	—P. S. boilers account		60 50
284.	James M. McDonnell, rubber boots					20 00
285.	John Demers, brick					58 00
286.	W. J. Noonan, supplies					19 30
287.	McLeod & Henry Co., fire brick					148 70
288.	William G. Raymond, new survey					704 80
289.	C. W. De Freest, new survey					105 00
290.	J. M. Francis & Son, advertising					6 50
291.	T. J. Hurley, log book					12 50
292.	H. McWhinnie, veterinary services					15 50
293.	H. G. Van Valkenburgh, hay					21 33
294.	C. F. Murnane, oats					20 70
295.	P. A. Gillespie, stable supplies					7 20
296.	Fogarty Wagon Works, repairs					3 45
297.	James Corr, shoeing					9 00
298.	Ludlow Valve Co., supplies					2 05
299.	Charles Barber, charcoal					25 80
300.	National Meter Co., meter repairs					10 10
301.	M. Mahony, castings					112 32
302.	Bayer & McConihe lumber					137 88
303.	Adams Laundry Machinery Co., engine repairs					48 05

304.	J. L. Pine Co., engine supplies	$ 54 63
305.	Mrs. C. A, Bounds, cleaning office	9 00
306.	Thomas A. Keith, Telegram at office	5 85
307.	B. Cooper & Co., ice	6 65
308.	Troy Gas Co., gas at office	5 40
309.	Troy Gas Co., gas at P. S.	58 95
	Total	$3,796 53

February, 1893.

310.	Monthly Pay Roll, Jan. —maintenance account.	$ 63 00
310.	" " " —construction account.	12 00
310.	" " " —office account	325 00
310.	" " " —P. S. account	890 00
311.	Weekly " " 28—maintenance account.	110 30
311.	" " " —construction account.	88 95
311.	" " " —shop account	67 37
311.	" " " —P. S. account	8 25
311.	" " " —P. S. boilers account.	68 55
312.	" " Feb, 4—maintenance account.	141 30
312.	" " " —shop account	88 50
312.	" " " —P. S. account	6 00
312.	" " " —P. S. boilers account,	68 55
313.	" " " 11—maintenance account.	126 45
313.	" " " —shop account	129 80
313.	" " " —P. S. account	8 25
313.	" " " —P. S. boilers account,	63 60
314.	" " " 18—maintenance account.	111 85
314.	" " " —shop account	107 40
314.	" " " —P. S. account	9 00
314.	" " " —P. S. boilers account.	72 60
315.	Walter D. Magill, supplies	79 21
316.	George Wheeler, repairs	52 28
317.	George B. Fales, clerk, disbursements	23 92
318.	Jarvis B. Edson, gauge charts	5 00
319.	W. J. Noonan, supplies	224 56
320.	William Donovan, teaming	2 00
321.	Michael Madden, wood	19 50
322.	Elnathan Sweet and William G, Raymond, expenses new survey, January	888 52

323.	McLeod & Henry Co., fire brick	$ 46 90
324.	T. H. Bowditch, blacksmithing	27 20
325.	Martin Payne, carting pipe	1 75
326.	James Corr, shoeing	15 00
327.	H. G. Van Valkenburgh, hay	23 73
328.	McCormick & Dunn, supplies	43 56
329.	Ludlow Valve Co., valve stem and supplies	13 45
330.	National Meter Co., one 4-inch meter	302 60
331.	Eddy Valve Co., valves	67 50
332.	Mrs. C. A. Bounds, care of office	9 00
333.	Troy Gas Co., gas at office	6 15
334.	H. B. Nims & Co., supplies	4 58
335.	Knowlson & Kelly, engine repairs	30 13
336.	Adams Laundry Machinery Co., engine repairs	7 82
337.	L. Katzenstein & Co., metallic packing	27 02
338.	H. R. Worthington, meter repairs	11 31
339.	Troy Gas Co., gas at P. S.	68 40
340.	Hughes, Simpson & Co., damages	5 00
	Total	$4,572 81

Recapitulation.

March, 1892	$ 2,500 72
April, 1892	3,414 55
May, 1892	11,342 30
June, 1892	6,771 57
July, 1892	7,226 79
August, 1892	2,992 36
September, 1892	4,308 05
October, 1892	39,738 64
November, 1892	10,249 14
December, 1892	5,216 59
January, 1893	3,796 53
February, 1893	4,572 81
Total	$102,130 05

All bills paid during the year are included in the above statement. In the report of the Superintendent only the cost of material actually used in the time covered by his report appears.

Included also in the above expenditures is the cost of material and labor used in the extension and relaying of mains, making the total cost for the year $10,951.99, as per statement which follows:

CONSTRUCTION.

The expenditures for account of material and labor used in construction are as follows:

1,658 feet 24-inch pipe	$4,111 84
69 feet 12-inch pipe	61 41
345 feet 8-inch pipe	186 30
2,683 feet 6-inch pipe	1,019 54
282 feet 4-inch pipe	64 86
1 24-inch valve	197 40
3 12-inch valves	109 00
2 10-inch valves	56 00
3 8-inch valves	63 00
15 6-inch valves	210 00
13 4-inch valves	117 00
36 valve boxes, 1 extra bottom	264 63
19 fire hydrants	501 60
2 24x6 crosses	93 80
6 24x4 tees	270 97
1 24-inch sleeve	14 63
1 12-inch bend	6 45
1 12-inch Y	26 00
2 12-inch sleeves	9 92
1 10x4 tee	9 38
2 10-inch sleeves	5 56
1 8x6 cross	9 46
1 8x6 tee	6 55
4 8x4 tees	24 17

3 8-inch sleeves	$ 8 18
1 6x6 cross	7 65
1 6x6 tee	4 86
9 6x4 tees	44 45
1 6x4 reducer	3 12
10 6-inch bends	28 42
3 6-inch sleeves	5 22
3 6-inch caps	2 67
1 4-inch offset	2 36
2 4-inch sleeves	1 86
10,462 lbs. lead	523 10
195 lbs. yarn	19 00
159 bush. coke	15 90
Wood	6 50
1602.9 days labor	2,404 35
Incidental expenses, cartage, etc	291 13
Total for mains laid	$10,808 24
Reconnecting 57 laterals, cost	125 90
1 brick valve pit, Sixth avenue, cost	17 85
Total	$10,951 99

The character and location of the work done for construction account during the past year, and the distribution of the material and labor employed therein, are shown in the following detailed account:

Details of Construction.

Placing fire hydrant and valve on southwest corner of Third and Broadway, 18 feet 4-inch pipe, 1 10x4 tee, 1 10-inch sleeve, 1 10-inch valve, 1 4-inch valve, 2 boxes, 1 fire hydrant, 96 lbs. lead, 1 bush. coke, 3½ lbs. yarn, cartage $1.00, 8.8 days labor. Cost	$113 65
Placing valve on Ingalls avenue on the west side of North Fourth street, 1 6-inch sleeve, 1 6-inch valve, 1 valve box, 40 lbs. lead, 1 lb. yarn, 1 bush. coke, 3 days labor. Cost	29 69

Placing valve on fire hydrant at Fourth and Madison streets, 3 feet 4-inch pipe, 1 4-inch sleeve, 1 4-inch valve, 1 valve box, 25 lbs. lead, 1 lb. yarn, 1 bush. coke, 1.8 days labor. Cost..... $ 22 02

Placing valve on fire hydrant at No. 404 Fourth street, 3 feet 4-inch pipe, 1 4-inch sleeve, 1 4-inch valve, 1 valve box, 25 lbs. lead, 1 lb. yarn, 1 bush. coke, 1.8 days labor. Cost..... 22 02

Extending main in Van Buren street, from Fourth street eastwardly, 27 feet 4-inch pipe, 1 4-inch valve, 1 valve box, 30 lbs. lead, 1 lb. yarn, 1 bush. coke, 19 days labor. Cost 52 66

Placing valve on fire hydrant on Fourth street, opposite Hanover, 1 4-inch valve, 1 valve box, 11 lbs. lead, 1 lb. yarn, 1 bush. coke, 6.9 days labor. Cost..... 27 35

Placing fire hydrant on northwest corner Fifth avenue and Liberty street, 1 fire hydrant, 6 lbs. lead, 1 lb. yarn, 1 bush. coke, 2.6 days labor. Cost..... 31 10

Extending main in Monroe street from a point 121 feet west of River street, 157 feet westwardly, 157 feet 8-inch pipe, 19 feet 4-inch pipe, 1 8x6 tee, 1 8x4 tee, 1 6-inch sleeve, 1 fire hydrant, 326 lbs. lead, 7 lbs. yarn, 4 bush. coke, cartage $3.50, 43.6 days labor. Cost..... 217 03

Extending 8-inch blow-off in Berger lane westwardly to creek, 48 feet 8-inch pipe, 56 lbs. lead, 1 lb. yarn, 1 bush. coke, 2.5 days labor. Cost..... 32 67

Placing valve in Alley, west of River street, on south side of Laureate avenue, 1 6-inch valve, 1 valve box, 2 days labor. Cost..... 24 25

Placing 12-inch valve on River street, south side of Hutton street, 4 feet 12-inch pipe, 1 12-inch sleeve, 1 12-inch valve, 1 valve box, 38 lbs. lead, 1 lb. yarn, 1 bush. coke, cartage $1.00, 9 days labor. Cost..... 70 27

Laying main in Douw street from main in North Fourth street to main in Sixth avenue, 247 feet 6-inch pipe, 2 6-inch valves, 2 valve boxes, 216 lbs. lead, 2 bush. coke, 2 lbs. yarn, cartage $8.00, 34.8 days labor. Cost..... 207 76

Extending main in North Fourth street from a point 213 feet north of the north line of Middleburgh street to Park avenue, 1,658 feet 24-inch pipe, 64 feet 4-inch pipe, 2 24x6 crosses, 6 24x4 tees, 6 6-inch bends, 1 24-inch sleeve, 1 24-inch bevel gear valve, 6 4-inch valves, 6 valve boxes, 3 fire hydrants, 1 brick valve pit, 5,567 lbs. lead, 38 bush. coke, 94 lbs. yarn, cartage $183.88, 791.8 days labor. Cost..... 6,593 85

Reconnecting 29 laterals. Cost..... 59 30

Extending main in Ferry street to a point 12 feet west of east line of Front street and laying main in Front street to a point 86 feet north of the north line of Ferry street, 143 feet 6-inch pipe, 1 6x6 cross, 3 6-inch caps, 1 6-inch valve, 1 valve box, 256 lbs. lead, 6 lbs. yarn, 4 bush. coke, cartage $2.00, 35.3 days labor. Cost..... 154 66

Placing valve on Washington street, east line of First street, 1 8-inch sleeve, 1 8-inch valve, 1 valve box, 49 lbs. lead, 1 lb. yarn, 1 bush. coke, 4.5 days labor. Cost..... 40 87

Placing fire hydrant southeast corner of Washington and First streets, 10 feet 4-inch pipe, 1 8x4 tee, 1 fire hydrant, 49 lbs. lead, 1 bush. coke, 1 lb. yarn, 6 days labor. Cost..... 46 07

Placing fire hydrant on Washington street, at northeast corner of alley, between First and Second streets, 10 feet 4-inch pipe, 1 8x4 tee, 1 fire hydrant, 49 lbs. lead, 1 lb. yarn, 1 bush. coke, 6 days labor. Cost... 45 91

Placing valve on fire hydrant, Fourth and Harrison streets, 1 4-inch valve, 1 valve box, 12 lbs. lead, 1 lb. yarn, 1 bush. coke, 2.5 days labor. Cost..... 20 80

Placing 6-inch valve south of south line of Tyler and Second streets, 1 6-inch sleeve, 1 6-inch valve, 1 valve box, 40 lbs. lead, 2 lbs. yarn, 2 bush. coke, 4.2 days labor. Cost..... 31 69

Placing 8-inch valve east of east line of Tyler and Second streets, 1 8-inch sleeve, 1 8-inch valve, 1 valve box, 50 lbs. lead, 2 bush. coke, 3 lbs. yarn, 6 days labor. Cost..... 42 22

Laying main in Tyler street, from main in First street to main in Second street, 140 feet 8-inch pipe, 11 feet 4-inch pipe, 1 8x6 cross, 1 8x4 tee, 1 8-inch sleeve, 1 fire hydrant, 1 8-inch valve, 1 valve box, 300 lbs. lead, 6 lbs. yarn. 4 bush. coke, cartage $3.15, 46.5 days labor. Cost..... 238 58

Extending main in Tyler street, from a point 590 feet east of Fourth street 288 feet eastwardly, 288 feet 6-inch pipe, 8 feet 4-inch pipe, 1 6x4 reducer, 1 6-inch valve, 1 valve box, 1 fire hydrant, 313 lbs. lead, 7 bush. coke, 5 lbs. yarn, cartage $4.47, 61.4 days labor. Cost..... 275 47

Placing fire hydrant on Van Buren street, at northeast corner of alley, between First and Second streets, 8 feet 4-inch pipe, 1 fire hydrant, 20 lbs. lead, 1 lb. yarn, 1 bush. coke, 6 days labor. Cost..... 38 44

Extending main in Van Buren street, from main in First street westwardly, 252 feet 6-inch pipe, 12 feet 4-inch pipe, 1 6x4 tee, 1 fire hydrant, 1 6-inch valve, 1 valve box, 268 lbs. lead, 5 lbs. yarn, 4 bush. coke, cartage $3.65, 55.7 days labor. Cost..... 253 83

Laying main in Kelly street, from main in Burden avenue to main in Cross street, 230 feet 6-inch pipe, 14 feet 4-inch pipe, 1 6x4 tee, 1 6-inch bend, 1 fire hydrant, 2 6-inch valves, 2 valve boxes, 172 lbs. lead, 4 lbs. yarn, 3 bush. coke, cartage $3.67, 46.6 days labor. Cost..... 249 90

Extending main in Cross street, from a point 277 feet south of Stow street to Kelly street, 425 feet 6-inch pipe, 22 feet 4-inch pipe, 2 6x4 tees, 1 6x6 tee, 1 6-inch bend, 1 6-inch valve, 1 valve box, 2 fire hydrants, 392 lbs. lead, 10 lbs. yarn, 7 bush. coke, cartage $6.37, 81.5 days labor. Cost..... 408 06

Relaying main in Harrison Place, from Federal street to Jacob street (formerly 3 and 4-inch), 753 feet 6-inch pipe, 21 feet 4-inch pipe, 3 6x4 tees, 1 4-inch offset, 2 6-inch valves, two valve boxes, 2 fire hydrants, 895 lbs. lead, 6 bush. coke, 17½ lbs. yarn, cartage $10.76, 146 days labor. Cost..... 681 87

Reconnecting 28 laterals. Cost..... 66 60

Extending main in Jefferson street from main in Second street to main in First street, 345 feet 6-inch pipe, 32 feet 4-inch pipe, 2 6-inch bends, 2 6x4 tees, 2 6-inch valves, 2 valve boxes, 2 fire hydrants, 409 lbs. lead, 4 bush. coke, 10 lbs. yarn, cartage $5.52, 78.8 days labor. Cost,.....	394 04
Placing 10-inch valve west of west line of Congress and First streets, 1 10-inch sleeve, 1 10-inch valve, 1 valve box, 114 lbs. lead, 1 lb. yarn, 2½ bush. coke, cartage 75 cents, 6.1 days labor. Cost.....	53 98
Placing valve on fire hydrant at Congress and Second streets, 1 4-inch valve, 1 valve box, 24 lbs. lead, 1 lb. yarn, 1 bush. coke, 2.5 days labor. Cost.....	21 40
Connecting Poestenkill with 12-inch line at Congress and Marshall streets, 65 feet 12-inch pipe, 1 12-inch bend, 1 12-inch sleeve, 1 12-inch Y, 2 12-inch valves, 2 valve boxes, copper screen $48.78, 314 lbs. lead, 54 bush. coke, 5 lbs. yarn, wood $6.50, cartage $4.63, 79.7 days labor. Cost.....	381 89
Total.....	$10,951 99

The following tables exhibit a comparative summary of the annual income of the Water Works for the last thirty-eight years (being the period of its present organization), together with the expenditures of the Department for the same time:

RECEIPTS.

YEAR.	Sale of Bonds.	Assessed Rents Payable to Chamberlain.	Paid to Chaimberlain by Clerk.	Total Receipts.
1855		$15,324 60	$5,520 94	$20,845 54
1856		16,005 57	5,169 16	21,174 73
1857		16,898 47	5,043 19	21,941 66
1858		17,131 11	4,770 56	21,901 77
1859		17,962 88	5,807 97	23,770 85
1860		18,479 61	4,122 90	22,602 51
1861		18,667 28	4,050 08	22,717 36
1862		16,696 93	7,784 70	24,481 63
1863		18,692 38	7,307 42	25,999 80
1864		20,117 12	6,925 76	27,042 88
1865		20,713 02	6,584 67	27,297 69
1866		21,958 13	7,684 03	29,642 16
1867		22,962 66	9,992 27	32,954 93
1868		25,162 50	13,958 26	39,120 76
1869		26,900 37	12,514 84	39,415 21
1870		28,619 47	10,272 16	38,891 63
1871		30,474 24	14,445 15	44,919 39
1872		32,906 84	12,010 66	44,917 50
1873		36,292 75	12,259 79	48,552 54
1874		38,192 06	9,584 59	47,776 65
1875		40,795 32	9,650 26	50,445 58
1876		43,007 20	8,491 94	51,499 14
1877		46,482 68	8,569 45	55,052 13
1878		47,791 32	6,911 00	54,702 32
1879	$203,153 00	48,383 10	9,720 68	261,256 78
1880	100,000 00	56,922 25	17,552 10	174,474 35
1881	50,000 00	61,273 00	18,336 44	129,609 44
1882		62,860 99	15,028 43	77,889 42
1883	50,000 00	63,708 54	17,522 79	131,231 33
1884	50,575 00	65,529 60	16,172 74	132,277 34
1885	27,734 20	65,617 42	16,416 66	109,768 28
1886		67,254 52	21,903 17	89,157 69
1887		69,336 62	20,083 64	89,420 26
1888		71,134 35	20,368 71	91,503 06
1889		63,064 03	22,446 66	85,510 69
1890		63,484 42	28,377 67	91,862 09
1891		65,339 97	26,020 06	91,360 03
1892		66,480 02	27,030 84	93,510 86
	$481,462 20	$1,528,623 34	$476,412 44	$2,486,497 98

EXPENDITURES.

YEAR.	Interest and Sinking Fund.	Construction.	MAINTENANCE.		Total Expenditures.
			Pumping.	General.	
1855	$5,000 00	.....	.....	$7,511 38	$12,511 38
1856	5,012 50	$8,868 69	.....	7,112 09	20,993 28
1857	4,761 87	11,855 08	.....	7,216 99	23,833 94
1858	4,511 69	11,484 69	.....	6,345 67	22,342 05
1859	4,510 69	8,783 43	.....	7,630 62	20,924 74
1860	4,059 06	10,140 80	.....	7,459 35	21,659 21
1861	3,582 88	15,864 65	.....	7,016 65	26,464 18
1862	3,558 88	15,652 10	.....	8,625 40	27,836 38
1863	3,308 25	9,615 55	.....	10,280 97	23,204 77
1864	3,057 62	5,907 61	.....	10,330 92	19,296 15
1865	3,057 63	1,107 04	.....	11,534 71	15,699 38
1866	3,050 00	1,720 52	.....	13,098 70	17,869 22
1867	2,550 00	16,761 55	.....	12,491 79	29,803 34
1868	2,550 00	25,942 79	.....	20,783 48	49,276 27
1869	2,300 00	29,856 48	.....	11,704 45	43,860 93
1870	2,050 00	46,181 24	.....	13,999 46	62,230 70
1871	2,500 00	8,822 69	.....	23,852 22	35,174 91
1872	1,900 00	10,071 75	.....	18,583 06	30,554 81
1873	1,750 00	11,015 67	.....	21,544 24	34,309 91
1874	1,750 00	31,726 01	.....	16,428 09	49,904 10
1875	1,375 00	31,315 63	.....	22,881 36	55,571 99
1876	1,000 00	7,347 43	.....	16,922 16	25,269 59
1877	1,000 00	16,888 22	.....	21,357 36	39,245 58
1878	1,000 00	48,866 58	.....	29,273 76	79,140 34
1879	14,500 00	280,744 21	.....	8,868 40	304,142 61
1880	23,500 00	86,521 75	$13,943 88	25,347 11	149,312 74
1881	24,750 00	35,863 78	18,530 83	23,115 30	102,259 91
1882	24,750 00	17,619 22	15,239 11	17,076 85	74,685 18
1883	25,625 00	106,384 68	19,013 97	27,818 87	178,842 52
1884	26,750 00	23,712 11	30,862 09	24,231 25	105,555 45
1885	28,000 00	39,411 86	29,749 65	31,312 90	128,474 41
1886	28,660 00	13,795 70	18,041 29	19,437 99	79,934 98
1887	28,410 00	8,812 37	22,500 78	28,370 84	88,093 99
1888	28,160 00	5,618 58	22,606 74	30,449 19	86,834 51
1889	27,910 00	18,956 13	20,033 95	34,641 94	101,542 02
1890	32,660 00	12,456 70	19,122 33	18,751 34	82,990 37
1891	32,235 00	12,259 67	21,427 04	21,695 71	87,617 42
1892	31,810 00	10,951 99	25,213 52	34,154 54	102,130 05
	$446,916 07	$1,056,934 95	$276,285 18	$679,257 11	$2,459,393 31

By deducting the total expenditures from the total resources it will be seen that the balance in the hands of the City Chamberlain at the end of the fiscal year 1892 was		$27,104 67
The balance in the hands of the City Chamberlain at the end of the fiscal year 1891 was	$35,723 86	
Add total receipts for fiscal year 1892, as per foregoing summary	93,510 86	
	$129,234 72	
Deduct total expenditures for fiscal year 1892, as per foregoing summary	102,130 05	
Shows balance in the hands of the City Chamberlain, February 28, 1893, (as above)		$27,104 67

NOTE.—The balance above is $4,384.54 in excess of the balance as reported by the Comptroller. This discrepancy has existed for a number of years and a committee of the Board to confer with the Comptroller, in relation to an adjustment of the difference, has the matter in charge.

COST OF THE WATER WORKS.

The total cost of the Water Works from 1833, when they were begun, to 1855, when the present Board was organized, was, as near as can be ascertained	$175,000 00
Construction to date, March 1, 1893	1,056,934 95
Entire cost (March 1, 1893)	$1,231,934 95

DISPOSITION OF THE INCOME.

For the last thirty-eight years the Common Council has annually appropriated all the surplus income of the Water Works for the extension and general improvement of the works. During that period the income has been disposed of as follows:

For salaries and maintenance		$955,542 29
For interest on debt	Old.... $ 70,696 07 New... 208,020 00	278,716 07
For sinking fund		168,200 00
For construction		1,056,934 95
Unexpended balance in hands of Chamberlain		27,104 67
Total		$2,486,497 98

WATER WORKS DEBT.

The present debt of the City of Troy on account of its Water Works is due entirely to the enlargement and extension that were commenced in 1879. It is as follows:

First—A series of 100 coupon bonds of $1,000 each, dated May 1, 1879, with interest payable semi-annually, at five per cent., and a provision for their payment at maturity by means of a sinking fund created by transferring annually to the custody of the Chamberlain, out of the regular taxable water rents of the Department, the sum of $4,000, and also an additional sum sufficient to pay the interest. Of this series the sum of $50,000.00 has been paid, leaving outstanding.... $50,000 00

Second—A series of 105 coupon bonds, ninety-five of which are for $1,000.00 each and ten for $500.00 each and dated August 1, 1879, with interest at 4½ per cent., payable semi-annually, and a provision for their payment at maturity by means of a sinking fund created by transferring annually to the custody of the Chamberlain of Troy, out of the regular taxable water rents of the Department, the sum of $7,000.00, a sufficient portion of which is to apply to the payment of the interest and the remainder to the payment of the principal; and this annual transfer of $7,000.00 is to continue until the amount in the aggregate, with the accumulations added thereto, shall be sufficient to pay said bonds and the interest thereon, when such transfer shall cease to be made. Of this series $30,000.00 has been paid, leaving outstanding..... $70,000 00

Third—A series of 20 coupon bonds of $5,000.00 each, dated April 1, 1880, with interest payable semi-annually at 3½ per cent., and a provision for their payment at maturity by means of a sinking fund created by transferring annually to the custody of the Chamberlain of Troy, out of the regular taxable water rents of the Department, the sum of $7,000.00, a sufficient portion of which is to pay the interest and the remainder to pay the principal; and such annual transfer of $7,000.00 to continue until the amount in the aggregate shall be sufficient to pay said bonds and the interest thereon, when such transfer shall cease to be made. Of this series $45,000.00 has been paid, leaving outstanding..... $55,000 00

Fourth—A series of 10 coupon bonds of $5,000.00 each, dated August 1, 1881, with interest at 3½ per cent., payable semi-annually, and a provision for their payment by means of a sinking fund created by transferring annually, out of the taxable water rents of the Department, to the custody of the Chamberlain of Troy for the use of said city, a sum sufficient in the aggregate to pay the interest of said bonds, and also the principal thereof at such dates and times respectively as the said principal and interest shall become due and payable; and such payments to be continued annually until the aggregate amount thereof shall be sufficient to pay and discharge the said bonds and interests in full as above provided. Of this series $10,000.00 has been paid, leaving outstanding..... $40,000 00

Fifth—A series of 10 coupon bonds of $5,000.00 each, dated May 1, 1883, with interest at 3½ per cent., payable semi-annually, and a provision for the payment of the principal and interest thereof out of the taxable water rents of the Department, at such times and in such amounts as the said principal and interest shall become due and payable; and such payments to be continued until all such bonds and interest shall be duly paid. The first bond of this series matures May 1, 1910, and the remainder at intervals of one year thereafter. $50,000 00

Sixth—A series of 6 coupon bonds, 2 thereof for $5,000.00 each, and 4 thereof for $10,000.00 each, dated June 2, 1884, with interest at 4 per cent., payable semi-annually, and a provision for the payment of the principal and interest thereof out of the taxable water rents of the Department, at such times and in such amounts as the said principal and interest shall become due and payable; and such payments to be continued until all such bonds and interest shall be duly paid..... $50,000 00

Seventh—A series of 27 coupon bonds, dated November 2, 1885, 2 thereof for $500.00 each and 25 thereof for $1,000.00 each, with interest at 3½ per cent., payable semi-annually, and a provision for the payment of the principal and interest thereof out of the taxable water rents of the Department, at such times and in such amounts as the said principal and interest shall become due and payable; and such payments to be continued until all such bonds and interest shall be duly paid. $26,000 00

Total debt at date..... $341,000 00

The payments made during the past year on account of the above indebtedness, and in accordance with the stipulated condition of issue, were as follows:

On the first issue (May, 1879,) six months' interest to May 1, 1892, on $60,000.00 at 5 per cent.....	$1,500 00	
And six months' interest to November 1, 1892, on $50,000.00 at 5 per cent.....	1,250 00	
Annual sinking fund payment.....	4,000 00	
		$6,750 00
On the second issue (August, 1879) one year's interest to August 1, 1893, on $70,000.00 at 4½ per cent.....	$3,150 00	
Annual sinking fund payment.....	3,850 00	
		$7,000 00
On the third issue (April, 1880,) one year's interest to April 1, 1893, on $55,000.00 at 3½ per cent.....	$1,925 00	
Annual sinking fund payment.....	5,075 00	
		$7,000 00

On the fourth issue (August, 1881,) one year's interest to August 1, 1893, on $40,000.00 at 3½ per cent.	$1,400 00	
Annual sinking fund payment	5,000 00	
		$6,400 00
On the fifth issue (May, 1883,) one year's interest to November 1, 1892, on $50,000.00 at 3½ per cent.		1,750 00
On the sixth issue (June, 1884,) one year's interest to December 1, 1892, on $50,000.00 at 4 per cent.		2,000 00
On the seventh issue (November, 1885,) one year's interest to November 1, 1892, on $26,000.00 at 3½ per cent		910 00
Total payments		$31,810 00

Average rate of interest about 4 per cent.

The dates, maturities and amounts of the several issues of city bonds representing the outstanding indebtedness of this Department are shown in the following table:

BONDED DEBT.

Date of Issue.	Series.	Rate of Interest.	Dates of Maturity in the order of time.	Am'ts maturing at dates named.
April 1, 1880	3d	3½	April 1, 1893	$ 5,000 00
August 1, 1881	4th	3½	August 1, 1893	5,000 00
April 1, 1880	3d	3½	April 1, 1894	5,000 00
May 1, 1879	1st	5	May 1, 1894	10,000 00
August 1, 1881	4th	3½	August 1, 1894	5,000 00
April 1, 1880	3d	3½	April 1, 1895	5,000 00
August 1, 1879	2d	4½	August 1, 1895	7,500 00
August 1, 1881	4th	3½	August 1, 1895	5,000 00
April 1, 1880	3d	3½	April 1, 1896	5,000 00
May 1, 1879	1st	5	May 1, 1896	10,000 00
August 1, 1881	4th	3½	August 1, 1896	5,000 00
April 1, 1880	3d	3½	April 1, 1897	5,000 00
August 1, 1881	4th	3½	August 1, 1897	5,000 00
April 1, 1880	3d	3½	April 1, 1898	5,000 00
May 1, 1879	1st	5	May 1, 1898	10,000 00
August 1, 1879	2d	4½	August 1, 1898	7,500 00
August 1, 1881	4th	3½	August 1, 1898	5,000 00
April 1, 1880	3d	3½	April 1, 1899	5,000 00
August 1, 1881	4th	3½	August 1, 1899	5,000 00
April 1, 1880	3d	3½	April 1, 1900	5,000 00
May 1, 1879	1st	5	May 1, 1900	10,000 00
August 1, 1881	4th	3½	August 1, 1900	5,000 00
April 1, 1880	3d	3½	April 1, 1901	5,000 00
August 1, 1879	2d	4½	August 1, 1901	7,500 00
April 1, 1880	3d	3½	April 1, 1902	5,000 00
May 1, 1879	1st	5	May 1, 1902	10,000 00

BONDED DEBT—*Continued.*

Date of Issue.	Series.	Rate of Interest.	Dates of Maturity in the order of time.	Amt's maturing at dates named.
April 1, 1880	3d	3½	April 1, 1903	$ 5,000 00
June 2, 1884	6th	4	June 1, 1903	5,000 00
June 2, 1884	6th	4	June 1, 1904	5,000 00
August 1, 1879	2d	4½	August 1, 1904	7,500 00
June 2, 1884	6th	4	June 1, 1905	10,000 00
June 2, 1884	6th	4	June 1, 1906	10,000 00
August 1, 1879	2d	4½	August 1, 1907	8,000 00
June 2, 1884	6th	4	June 1, 1908	10,000 00
June 2, 1884	6th	4	June 1, 1909	10,000 00
May 1, 1883	5th	3½	May 1, 1910	5,000 00
August 1, 1879	2d	4½	August 1, 1910	8,000 00
May 1, 1883	5th	3½	May 1, 1911	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1911	5,000 00
May 1, 1883	5th	3½	May 1, 1912	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1912	5,000 00
August 1, 1879	2d	4½	August 1, 1913	8,000 00
May 1, 1883	5th	3½	May 1, 1913	5,000 00
May 1, 1883	5th	3½	May 1, 1914	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1914	7,500 00
May 1, 1883	5th	3½	May 1, 1915	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1915	7,500 00
May 1, 1883	5th	3½	May 1, 1916	5,000 00
August 1, 1879	2d	4½	August 1, 1916	8,000 00
May 1, 1883	5th	3½	May 1, 1917	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1917	1,000 00
May 1, 1883	5th	3½	May 1, 1918	5,000 00
May 1, 1883	5th	3½	May 1, 1919	5,000 00
August 1, 1879	2d	4½	August 1, 1919	8,000 00
Total.....				$341,000 00

RAIN-FALL.

Through the courtesy of Alfred F. Sims, observer, United States Weather Bureau, Albany, N. Y., the following record of the rain-fall, as taken by him, for the year 1892, is presented.

We also append a condensed statement of the rain-fall for the last sixty-six years, giving the fall for each year and each month of the year, and also the monthly and yearly averages for the entire period.

The rain-fall is also given for the months of January and February, 1893.

STATEMENT OF RAIN-FALL FOR 1892.

Month.	Date.	Inches.	Monthly Totals.	Month.	Date.	Inches.	Monthly Totals.
Jan....	2..	.89		Feb....	2..	*.55	
	3..	*.08			3..	*.20	
	6..	.35			5..	*.05	
	7..	.01			7..	*.02	
	9..	.01			8..	.10	
	11..	.02			11..	*.38	
	12..	.01			15.	.02	
	13..	.78			20..	.69	
	14..	.41			21..	.11	
	15..	.59			26..	.01	
	18..	*.22					2.13 in.
	19..	.66					
	20..	.02					
	23..	.02					
	24..	.01					
			4.08 in.				

*Melted snow.

Statement of Rain-fall—*Continued.*

Month.	Date.	Inches.	Monthly Totals.	Month.	Date.	Inches.	Monthly Totals.
March .	1..	*.03		June...	2..	.80	
	2..	*.61			3..	.02	
	8..	.35			4..	.07	
	9..	.12			8..	.01	
	10..	.16			9..	.06	
	15..	*.01			14..	.08	
	18..	*.05			16..	.03	
	19..	*.03			18..	.01	
	23..	.28			20..	.03	
			1.64 in.		21..	.11	
					22..	.12	
					23..	.27	
					25..	.01	
					27..	.53	
					28..	2.01	
					30..	.25	
April ..	9..	.10					4.41 in.
	21..	.34		July ...	1..	.03	
	22..	.02			3..	.55	
	23..	.10			4..	.51	
			.56 in.		8..	.29	
					9..	.46	
					13..	.06	
					16..	.20	
					19..	.02	
					23..	.02	
May....	1..	.17			25..	.40	
	2..	.23			29..	.53	
	3..	.04			31..	1.15	
	4..	.90					4.22 in.
	6..	.23		Aug ...	2..	.08	
	11..	.22			3..	.24	
	12..	.02			4..	.01	
	13..	.04			5..	.61	
	14..	.01			6..	.12	
	15..	.43			9..	.03	
	16..	.01			10..	.22	
	19..	.01			11..	1.02	
	20..	.68			12..	.83	
	21..	1.05			19..	.04	
	22..	.05			20..	.10	
	23..	.32			25..	1.74	
	25..	.08			26..	1.28	
	27..	.62			27..	.22	
	30..	.19			31..	.16	
			5.30 in.				6.70 in.

* Melted snow.

STATEMENT OF RAIN-FALL—*Continued.*

Month.	Date.	Inches.	Monthly Totals.	Month.	Date.	Inches.	Monthly Totals.
Sept...	5..	.04		Nov ...	2..	.35	
	6..	.80			3..	.05	
	13..	.01			4..	.13	
	14..	.59			8..	.04	
	19..	.01			10..	.15	
	22..	.04			16..	1.31	
	23..	.04			18..	.16	
	24..	.49			25..	.01	
	26..	.09			28..	.09	
			2.08 in.				2.29 in.
Oct....	1..	.01					
	4..	.08					
	5..	.03					
	8..	.01					
	9..	.27					
	14..	.01		Dec....	3..	.08	
	16..	.01			6..	.16	
	19..	.09			8..	.41	
	26..	.01			9..	.01	
	29..	.05			14..	.14	
	30..	.03			25..	.02	
			.60 in.				.82 in.

RECAPITULATION.

January	4.08 inches.
February	2.13 "
March	1.64 "
April	.56 "
May	5.30 "
June	4.41 "
July	4.22 "
August	6.70 "
September	2.08 "
October	.60 "
November	2.29 "
December	.82 "
Total	34.83 inches.

RAIN-FALL FOR JANUARY AND FEBRUARY, 1893.

Month.	Date.	Inches.	Monthly Totals.	Month.	Date.	Inches.	Monthly Totals.
Jan....	1..	.48		Feb....	1..	*.11	
	2..	.12			2..	*.09	
	9..	*.08			3..	.14	
	10..	*.08			6..	.13	
	12..	*.02			7..	.22	
	15..	*.06			10..	.11	
	24..	*.04			13..	*.90	
	25..	*.02			14..	*.30	
	29..	.21			18..	*.62	
	31..	*.20			20..	*.13	
			1.31 in.		22..	*1.48	
					23..	*.02	
					24..	*.23	
					25..	*.09	
					28..	*.06	
							4.63 in.

*Melted snow.

METEOROLOGICAL REGISTER CONDENSED.

FROM JANUARY 1, 1826, TO DECEMBER 31, 1892, BOTH INCLUSIVE.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1826..	2.42	1.64	2.56	1.77	.93	7.45	4.62	1.14	3.90	2.22	1.52	1.99	32.16
1827..	5.18	2.42	2.24	3.98	3.21	3.64	4.28	4.88	4.27	4.32	4.19	4.20	46.81
1828..	1.89	1.89	1.17	2.50	4.41	4.25	5.15	1.24	7.97	1.58	5.65	.21	37.91
1829..	4.68	3.19	2.49	4.92	3.26	3.48	3.23	1.61	2.92	2.78	3.77	2.01	38.34
1830..	.97	1.44	4.97	2.09	3.46	8.23	3.92	2.05	2.11	2.55	5.48	3.40	40.67
1831..	1.62	2.01	2.36	5.18	2.75	3.98	3.93	3.41	3.92	5.20	2.31	1.16	37.83
1832..	4.52	5.52	1.99	3.11	4.17	3.23	5.13	4.41	2.37	4.00	3.55	3.83	45.83
1833..	2.92	2.85	1.91	.87	7.86	3.12	4.08	3.50	3.50	8.40	3.67	1.55	44.23
1834..	.95	.33	1.82	2.52	3.04	2.87	3.24	1.53	1.99	4.02	.80	2.60	25.71
1835..	.25	1.30	.17	1.52	1.86	4.83	2.10	4.10	.95	1.96	2.11	1.00	22.15
1836..	4.93	2.70	1.25	1.60	2.38	4.69	1.93	1.57	1.61	4.40	2.45	4.07	33.58
1837..	1.78	2.08	2.31	2.26	4.74	4.65	5.50	2.46	1.55	2.47	1.77	1.77	33.34
1839..	1.00	.15	.58	1.24	.92	2.65	2.19	.92	2.59	1.70	1.12	3.26	18.32
1840..	1.90	2.85	3.08	3.52	.20	1.93	1.98	2.55	2.01	3.48	2.41	3.30	29.21
1841..	2.30	.92	1.75	1.50	1.69	2.00	1.29	3.30	4.10	.85	2.87	5.27	27.84
1842..	2.25	1.00	2.06	4.43	.90	3.17	2.40	3.35	2.90	1.95	1.20	3.95	29.56
1843..	1.80	1.90	3.45	2.90	.73	4.10	2.45	5.10	2.80	4.05	2.20	1.40	32.88
1844..	.81	1.95	1.15	.50	4.35	3.45	3.60	1.45	1.10	3.05	1.65	1.40	24.46
1845..	2.20	1.60	3.00	1.50	2.50	2.35	4.10	2.50	4.35	2.05	2.10	2.50	30.75

METEOROLOGICAL RECORD—Continued.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1846..	1.50	3.70	2.95	.25	2.37	4.41	6.02	1.38	3.50	2.83	5.59	2.98	37.48
—	—	RECO	RD WA	NTING.	—	—	—	1.49	4.27	3.64	1.76	4.17	15.33
1848..	2.27	1.81	1.99	.78	6.01	2.91	6.36	3.47	2.99	3.45	1.91	4.69	38.64
1849..	.82	.80	2.58	.90	4.60	5.06	1.15	4.87	1.26	6.98	2.53	2.18	33.73
1850..	2.65	1.87	.45	2.86	5.40	3.20	5.98	3.07	5.08	4.41	2.42	3.47	40.86
1851..	.67	3.86	.65	3.28	2.33	4.26	4.66	1.68	1.08	2.46	4.61	.29	29.83
1852..	2.54	1.11	2.73	4.29	2.41	1.86	3.19	2.48	1.35	3.04	4.09	2.80	31.89
1853..	1.12	3.53	2.20	3.55	6.36	1.75	3.74	3.71	6.10	3.17	3.33	1.60	40.16
1854..	2.46	2.50	2.49	5.83	1.87	3.05	2.58	1.09	2.28	2.49	2.30	2.08	31.02
1855..	2.37	1.46	.59	3.27	1.94	6.05	4.42	4.05	1.55	9.42	3.37	3.74	42.23
1856..	1.00	.23	1.22	2.31	5.15	3.44	1.74	11.09	4.00	1.16	2.75	2.70	36.79
1857..	2.50	1.78	1.05	6.36	3.70	4.63	3.51	3.64	2.22	3.31	1.94	3.87	38.51
1858..	2.00	1.63	.61	2.68	3.35	2.67	9.19	2.98	2.31	3.10	3.09	2.67	36.28
1859..	3.13	1.94	2.99	3.38	2.19	4.27	2.92	2.53	4.55	1.22	3.48	3.77	36.37
1860..	.41	1.61	2.35	1.38	2.46	3.54	4.34	8.46	4.39	2.24	3.64	2.30	37.12
1861..	3.47	2.60	3.68	6.28	3.82	1.64	4.95	4.59	3.14	3.20	2.72	1.65	41.74
1862..	5.33	2.07	3.77	1.83	.91	7.67	4.25	2.27	.84	3.72	4.32	1.54	38.52
1863..	4.92	2.51	4.04	1.38	5.55	2.04	7.66	7.24	1.62	2.32	5.02	4.10	48.40
1864..	1.61	.86	3.50	4.62	2.43	.62	1.06	5.69	2.72	2.68	3.68	3.92	33.39
1865..	2.27	1.96	4.84	2.87	5.97	1.98	3.62	.93	2.14	3.88	2.67	1.38	34.51

METEOROLOGICAL RECORD—Continued.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1866..	1.35	1.70	1.08	1.45	2.43	6.71	3.85	3.18	4.73	1.68	2.94	.66	31.76
1867..	2.42	1.91	2.26	3.20	5.75	3.24	3.41	7.29	1.50	3.20	1.64	1.24	37.06
1868..	3.33	.86	2.06	3.79	6.33	3.20	2.35	3.85	8.48	1.58	4.94	1.64	42.41
1869..	3.99	3.38	3.81	2.72	2.04	5.79	2.49	1.76	3.45	13.80	.58	4.24	48.05
1870..	4.47	5.08	3.59	2.42	1.44	5.65	5.01	5.56	3.01	2.87	1.82	1.06	41.98
1871..	1.60	1.64	3.85	2.40	3.05	4.81	7.24	8.92	1.78	2.37	2.24	1.80	41.70
1872..	.78	1.74	2.70	1.81	4.79	4.68	5.60	4.84	2.55	4.68	2.77	2.18	39.12
1873..	3.32	2.11	3.65	1.99	1.98	.99	5.97	2.27	4.78	5.57	3.75	3.03	39.41
1874..	3.96	3.76	1.86	5.37	2.27	7.22	6.23	.77	2.78	1.76	2.55	.84	39.37
1875..	2.21	1.65	3.46	2.79	2.15	3.67	4.40	4.78	2.42	5.44	2.25	1.20	36.42
1876..	1.57	4.09	4.28	3.51	2.96	4.40	4.97	.53	5.17	1.64	2.65	2.42	38.19
1877..	1.94	.34	2.66	2.13	1.55	4.52	5.00	2.06	1.13	7.84	3.14	.59	32.90
1878..	4.01	3.72	1.94	4.53	4.60	4.68	6.12	3.80	2.63	3.32	5.18	4.70	49.23
1879..	2.72	2.23	3.82	2.90	.65	7.42	5.82	3.60	3.55	1.80	3.53	4.22	42.26
1880..	2.80	1.87	1.20	2.07	3.03	1.09	3.04	2.76	2.88	2.43	2.49	1.99	27.65
1881..	2.86	2.50	3.80	1.34	3.90	3.76	2.22	2.07	2.38	3.19	3.44	4.88	36.34
1882..	2.64	3.31	1.79	1.27	4.15	3.98	3.97	1.38	7.79	.27	.97	2.24	33.76
1883..	2.43	3.00	1.77	2.65	3.20	6.30	5.96	3.69	3.19	3.49	1.14	2.55	39.37
1884..	2.98	3.85	4.00	2.09	2.79	1.80	5.04	5.27	1.80	2.64	3.44	3.20	38.90
1885..	3.09	1.38	.62	2.89	1.92	1.98	1.98	7.58	2.00	5.54	3.90	1.51	34.39

METEOROLOGICAL RECORD—Concluded.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1886..	3.66	1.40	2.73	3.67	3.40	3.19	2.56	.87	2.51	2.43	5.40	2.19	34.01
1887..	3.02	2.86	2.90	2.49	2.27	2.99	4.61	4.61	1.94	2.22	4.36	5.43	39.70
1888..	3.04	2.07	5.62	1.95	2.98	3.18	2.52	4.74	4.68	6.10	4.48	3.30	44.66
1889..	2.82	1.81	1.76	1.25	3.32	6.43	4.19	3.63	3.68	3.48	5.00	2.14	39.51
1890..	2.28	2.52	3.72	1.64	5.19	2.72	2.37	5.66	8.91	5.76	1.18	2.94	44.89
1891..	6.12	4.14	3.12	2.27	1.69	2.65	6.11	5.88	1.94	2.13	2.40	3.23	41.68
1892..	4.08	2.13	1.64	.56	5.30	4.41	4.22	6.70	2.08	.60	2.29	.82	34.83
Total.	166.90	142.62	160.68	173.16	207.31	250.58	263.71	235.83	208.04	227.58	196.51	171.01	2,403.93
Avgs.	2.57	2.19	2.47	2.66	3.19	3.86	4.06	3.58	3.15	3.45	2.98	2.59	36.75

LOCATION, SIZE AND LENGTH

OF

STREET WATER MAINS

(IN ALPHABETICAL ORDER.)

The following embraces a complete schedule, revised to date, of all the water mains (exclusive of service laterals) laid in the city by the Troy Water Works to the present time:

STREET.	FROM AND TO.	FEET.
Adams street:		
8 in.	Point 46 feet west River street, main in Hill street	1,836
Alley between River and First streets:		
6 in.	Main in Congress street, main in Ferry street	410
1½ in.	" Liberty street, southwardly	80
1½ in.	" Washington street, southwardly	120
6 in.	" Adams street, northwardly	183
Alley between River and Second streets:		
6 in.	Main in Polk street, main Main street	577
Alley between First and Second streets:		
6 in.	Main in Broadway, main in State street	476
1½ in.	" State street, southwardly	180
6 in.	" Ferry street, main in Division street.	504
Alley between Second and Third streets:		
1½ in.	Main in River street, southwardly	80
6 in.	" Broadway, main in Ferry street	1337
1½ in.	" Division street, northwardly	175
4 in.	" Division street, main in Liberty street	282
6 in.	" Liberty street, main in Washington street	349

STREET.	FROM AND TO.	FEET.
Alley between Third and Fourth streets:		
4 in.	—Main in Fulton street, southwardly	380
1½ in.	— " Broadway, northwardly	80
6 in.	— " " main in State street	466
Alley between Fourth street and Fifth avenue:		
1½ in.	—Main in Broadway, southwardly	235
1½ in.	— " State street, southwardly	80
1½ in.	— " Congress street, southwardly	220
6 in.	— " Madison street, main in Hanover street	1016
Alley between Fifth and Sixth avenues:		
6 in.	—Main in Fulton street, main in Grand street.	392
Alley between Sixth avenue and Seventh street:		
6 in.	—Main in Fulton street, main in Grand street.	340
6 in.	— " Broadway, south, main in alley north of State street	280
6 in.	—Main in Hill street, northwardly	36
Alley north of State street:		
6 in.	—Main in Sixth avenue, main in Seventh street	300
Alley north of Ferry street:		
3 in.	—Main in Seventh street, eastwardly	118
4 in.	—118 feet east of Seventh street, eastwardly	190
4 in.	—308 feet " " " southwardly., main in Ferry street	106
Bank street:		
6 in.	—304 feet east of main in Brunswick avenue, main Prospect avenue	776
Bedford street:		
6 in.	—Main in Hanover street, southwardly	188
Berger lane:		
8 in.	—Main in Lark street, creek	258
Bleecker avenue:		
6 in.	—Main in Tibbits avenue, main in Highland avenue	470
Bond street:		
6 in.	—Main in River street, west side of Turner street	530

STREET.	FROM AND TO.	FEET.
Broadway:		
6 in.—	Main in River street west to blow off	200
8 in.—	" River street, main in Seventh street	1845
3 in.—	" Seventh street, main in Institute avenue	163
Brunswick avenue:		
20 in.—	Main in Congress street, main in Tibbits avenue	1138
Brunswick turnpike:		
8 in.—	Main in Congress street, eastwardly to city line	591
Burden avenue:		
12 in.—	Main in Main street, north end Wynantskill bridge	1545
At south end of Wynantskill bridge:		
8 in.—	Into creek blow-off	21
8 in.—	North end of bridge, junction with Water street	600
6 in.—	Junction with Water street, south and east	843
8 in.—	Point 843 feet from main in Water street, junction of Vandenburgh avenue	1455
Burdett avenue:		
20 in.—	North line of Hoosick street, main in Tibbits avenue	5000
Campbell highway:		
12 in.—	Main in Spring avenue, main in Vandenburgh avenue	5793
Canal avenue:		
12 in.—	At First street bridge	6
6 in.—	" "	16
6 in.—	At Second "	32
12 in.—	At Third "	61
6 in.—	At Fourth "	24
8 in.—	" "	16
Chestnut street;		
6 in.—	Main Elm street, northwardly	400
Center street:		
6 in.—	Main in Burden avenue, westwardly to railroad	192

STREET.	FROM AND TO.	FEET.
Cemetery avenue:		
6 in.	—Main in Sixth avenue, main in River street..	318
Christie street:		
6 in.	—Main in Congress street, main in Seventeenth street.....	1018
Collins avenue:		
6 in.	—Main in Pawling avenue, main in Maple avenue.....	1200
Congress street:		
8 in.	—Main in River street, Hudson river.....	250
10 in.	—Main " west side of Sixth avenue	2012
4 in.	—West side of Sixth avenue, main in Seventh street.....	150
8 in.	—Main in Seventh street, main in Eighth street	484
12 in.	—Main in Eighth street, main in Brunswick avenue.....	3533
12 in.	—Connecting main on Marshall estate with main in Congress street, east of Cypress street.....	69
20 in.	—Main in Brunswick avenue, north end stone bridge.....	347
Cragin avenue:		
6 in.	—24-inch main in Glen avenue, southwardly...	610
Cross street:		
6 in.	—Main in Stow street, southwardly.....	702
Cypress street:		
6 in.	—Main in Congress street, southwardly to wire mill.....	917
Defreest avenue:		
8 in.	—Main in Mill street, southwardly city line....	665
Division street:		
6 in.	—Main in Fourth street, Hudson river.....	1687
Douw street:		
4 in.	—Main in River street, westwardly to blow-off	635
6 in.	—Main in River street, east line of North Fourth street.....	516

STREET.	FROM AND TO.	FEET.
Eagle street:		
6 in.	8-inch main in Eighth street, 147 feet east of Ninth street	406
6 in.	Main in Twelfth street, main in Fourteenth street	524
6 in.	Main in Fifteenth street, eastwardly	96
Eighth street:		
20 in.	North line of Middleburgh street, center of Federal street	4630
16 in.	Center of Federal street, main in Congress street	2052
8 in.	Main in Hoosick street, 240 feet south of Fulton street	3167
Eleventh street:		
6 in.	112 feet south of Jacob street, 77 feet north of Eagle street	612
6 in.	Main in Middleburgh street, main in Ingalls avenue	450
Elm street, Fifth ward:		
6 in.	Main in Chestnut street, main in Cypress street	193
Elm street, Sixth ward:		
6 in.	Main in Water street, south city line	241
Erie street:		
8 in.	Main in Mill street, main in Snyder avenue	649
Factory road:		
6 in.	Main in Hill street, eastwardly	362
Farm street:		
6 in.	Main in Congress street, main in Fourteenth street	1049
Federal street:		
8 in.	Main in River street, west side of Front street	224
20 in.	Main in River street, main in Eighth street	1335
16 in.	Main in Eighth street, main in Ninth street	257

STREET.	FROM AND TO.	FEET.
Ferry street:		
6	in.—Main in Fourth street, east side of Front street	1507
8	in.—Main in Fourth street, main in Fifth avenue.	342
6	in.—Main in Fifth avenue, main in Seventh street	506
8	in.—Main in Seventh street, junction with Congress street	1048
Fifteenth street:		
8	in.—Main in South street, main in Tibbits avenue	412
6	in.—Main in Tibbits avenue, main in Marshall street	810
6	in.—Main in Jacob street, 148 feet north of main in Hutton street	945
Fifth avenue:		
8	in.—148 feet north of Rensselaer street, main in Jacob street	2841
6	in.—Main in Jacob street, 26 feet south of Liberty street	3994
6	in.—125 feet north of Washington street, junction with Hill street	509
6	in.—Main in Adams street, main in Ida street	968
6	in.—South line Canal avenue, main in Madison street	457
First street:		
4	in.—Main in River street, north line of Jefferson street	3464
6	in.—North line of Jefferson street, main in Ida street	431
12	in.—Main in Ida street, center of Canal avenue	168
6	in.—Center of Canal avenue, junction with Second street	3786
Fourth street:		
20	in.—Main in Federal street, main in Ida street	5291
8	in.—Main in Ida street, Center of Canal avenue	186
6	in.—Center of Canal avenue, main in Madison street	480
16	in.—Main in Madison street, main in Main street.	3953
4	in.—Main in Jackson street, brewery	200
8	in.—Main in Division street, southwardly, sewer.	55

STREET.	FROM AND TO.	FEET.
Fourteenth street:		
8 in.	Main in Hutton street, main in Peoples' avenue	1255
6 in.	Main in Hutton street, northwardly	186
8 in.	Main in South street, junction with Marshall street	1237
Frear avenue:		
4 in.	Main in Oakwood avenue, westwardly	552
Front street:		
6 in.	Main in Federal street, main in Fulton street	812
6 in.	At Congress street	12
6 in.	Main in Ferry street, northwardly	143
Fulton street:		
6 in.	Main in Front street, main in River street	195
8 in.	Main in River street, main in Eighth street	1651
8 in.	16-inch main in Eighth street, sewer	22
Glen avenue:		
20 in.	Main in River street, main in North Fourth street	615
24 in.	Main in North Fourth street, lower distributing reservoir	2168
6 in.	On blow-off from 30-inch pipe	18
6 in.	On blow-off from 24-inch pipe	16
Grand street:		
6 in.	Main in River street, westwardly, blow-off	226
10 in.	Main in River street, east side of Sixth avenue	772
6 in.	East side Sixth avenue, main in Seventh street	299
8 in.	Main in Seventh street, main in Eighth street	364
Grant avenue:		
6 in.	Main in Sherman avenue, main in Thompson street	654
Green street:		
6 in.	Main in Hutton street, main in Hoosick street	640
6 in.	Main in Rensselaer street, main in North street	835

STREET.	FROM AND TO.	FEET.
Hanover street:		
6 in.	—Main in Fourth street, orphan asylum	420
Havermans avenue:		
4 in.	—Main in Liberty street, southwardly	1090
Harrison place:		
6 in.	—Main in Federal street, main in Jacob street	753
3 in.	—Main in Jacob street, northwardly	445
4 in.	—457 feet north of Jacob street, northwardly	117
Harrison street:		
6 in.	—Main in Fourth street, east line, west line	66
Highland avenue:		
6 in.	—Main in Bleecker avenue, main in Seventeenth street	951
High service:		
20 in.	—Reservoir, north line of Hoosick street	4468
Hill street:		
6 in.	—Main in Liberty street, junction with Spring avenue	2843
Hoosick street:		
10 in.	—Main in River street, main in Fifth avenue	282
8 in.	—Main in Fifth avenue, center of Eighth street	842
12 in.	—Center of Eighth street, main in Burdett avenue	3130
House avenue:		
6 in.	—Main in Ninth street, eastwardly	340
Howard street:		
8 in.	—Main in Erie street, main in Thompson street	526
Hopkins street:		
6 in.	—Main in Thompson street, main in Mechanic street	257
Hutton street:		
8 in.	—Main in River street, Hudson river	160
6 in.	—Main in River street, main in North Fourth street	864
8 in.	—Main in Eighth street, main in Fourteenth street	1578
6 in.	—Main in Fourteenth street, main in Seventeenth street	785

STREET.	FROM AND TO.	FEET.
Ida street:		
6 in.	—24 feet west of First street, westwardly to railroad	184
8 in.	—24 feet west of First street, main in Third street	710
20 in.	—Main in Third street, main in Fourth street	333
8 in.	—Main in Fourth street, east side of Sixth avenue	650
6 in.	—East side Sixth avenue, main in Seventh street	460
Ingalls avenue:		
8 in.	—Main in River street, Hudson river	275
12 in.	—Main in River street, corner of Sixth avenue	273
6 in.	—Center of Sixth avenue, 10 feet east of 20-inch main in Eighth street	684
6 in.	—Main in Ninth street, main in Eleventh street	514
Institute avenue:		
4 in.	—Main in Broadway, southwardly	273
Jackson street:		
6 in.	—188 feet west of First street, main in Second street	541
4 in.	—Main in Second street, main in Fourth street	520
Jacob street:		
6 in.	—Main in River street, west side of North Fourth street	882
8 in.	—West side North Fourth street, main in Eighth street	323
6 in.	—Main in Eighth street, west side Sixteenth street	2067
Jay street:		
6 in.	—Main in Fifth avenue, main in Sixth avenue	330
Jefferson street:		
6 in.	—Main in First street, Main in Hill street	1691
Kelly street:		
6 in.	—Main in Burden avenue, main in Cross street	230
King street:		
6 in.	—Upper junction with River street, main in Jacob street	432
3 in.	—Main in Jacob street, lower junction with River street	596

STREET.	FROM AND TO.	FEET.
Lansing avenue:		
6	in.—Main in Walker avenue, main in Maple avenue	620
Lark street:		
8	in.—Main in Vandenburgh avenue, junction with Berger lane	282
6	in.—Main in Berger lane, south city line	180
Laureate avenue:		
6	in.—Main in River street, Hudson river	608
Laundry place:		
3	in.—Main in King street, eastwardly 100 feet, then southwardly 175 feet	275
Liberty street:		
6	in.—East side Front street, main in Fifth avenue.	1853
4	in.—Main in St. Mary's avenue, main in Havermans avenue	126
Lincoln avenue:		
8	in.—Main in Fourth street, west side of Francis street	800
Linden avenue:		
6	in.—Main in Pawling avenue, Marshall infirmary.	1116
Locust avenue:		
6	in.—Main in Pawling avenue, westwardly	601
Low service main:		
24	in.—Junction of 12-inch and 20-inch, reservoir	1394
20	in.—Junction of 24-inch at Eddy's, north line of Middleburgh street	1700
12	in.—Junction of 24-inch at Eddy's, main in Ingalls avenue	1650
Madison street:		
6	in.—West side of River street, main in First street	393
8	in.—Main in First street, main in Third street	682
16	in.—Main in Third street, main in Fourth street.	330
6	in.—Main in Fourth street, main in Fifth avenue.	333
Main street:		
8	in.—Main in Fourth street, main in Second street.	39
4	in.—Main in Second street, westwardly to railroad	280

STREET.	FROM AND TO.	FEET.
Mann avenue:		
6 in.	—Main in Fourth street, westwardly	576
Maple avenue:		
6 in.	—Main in Pine Woods avenue, main in Pawling avenue	1671
12 in.	—Main in Pawling avenue, main in Spring avenue	1215
Marshall street:		
6 in.	—Main in Fifteenth street, main in Fourteenth street	266
8 in.	—Junction of Fourteenth street, main in Congress street	182
6 in.	—Main in Congress street, main in Chestnut street	332
Mechanic street:		
6 in.	—Main in Howard street, main in Hopkins street	350
Middleburgh street:		
12 in.	—Main in River street, main in Sixth avenue	432
24 in.	—Main in Sixth avenue, main in North Fourth street	220
12 in.	—Main in North Fourth street, main in Oakwood avenue	1486
Middle service main:		
20 in.	—63 feet south of Frear avenue, Middle Service reservoir	1553
Mill street:		
8 in.	—Main in Burden avenue, main in Vandenburgh avenue	2511
Monroe street:		
8 in.	—357 feet west of River street, main in alley east of Fourth street	1857
Mount street:		
6 in.	—Main in North street, northwardly	31
4 in.	—31 feet north of main in North street, main in Ingalls avenue	689

STREET.	FROM AND TO.	FEET.
Myrtle avenue:		
8 in.	Main in Pawling avenue, main in Spring avenue	895
Ninth street:		
6 in.	Main in House avenue, main in People's avenue	5768
16 in.	Main in People's avenue, main in Federal street	405
6 in.	Main in Federal street, southwardly	130
North street:		
8 in.	Main in Sixth avenue, main in River street	500
North Adams street:		
6 in.	Main in Eighth street, main in Tenth street	512
North Fourth street:		
24 in.	Main in Glen avenue, main in Middleburgh street	2227
8 in.	Main in Glen avenue, north city line	278
6 in.	Main in Hoosick street, main in Federal street	2275
Oakwood avenue:		
20 in.	Junction with Tenth street, junction with force main	3777
Orrs street:		
6 in.	Main in Ingalls avenue, south line of Douw street	509
Park avenue:		
6 in.	Main in North Fourth street, main in Cragin avenue	429
Pawling avenue:		
16 in.	North end of Stone bridge, 48 feet south of Maple avenue	4240
12 in.	48 feet south of Maple avenue, 12 feet south of Myrtle avenue	301
People's avenue:		
16 in.	Main in Ninth street, main in Tenth street	260
12 in.	Main in Tenth street, main in Burdett avenue	2620

STREET.	FROM AND TO.	FEET.
Pine street:		
6 in.	Main in Fifth avenue, main in Read's alley	170
Pine Woods avenue:		
6 in.	Main in Pawling avenue, main in Maple avenue	2250
Polk street:		
6 in.	Main in Fourth street, alley west of Second street	410
President street:		
6 in.	Main in Ingalls avenue, 11 feet south of main in Douw street	575
4 in.	11 feet south of main in Douw street, main in Douw street	11
4 in.	253 feet south of centre of Bond street, 126 feet north of Bond street	379
Prospect avenue:		
6 in.	Main in Bank street, southwardly	300
Read's alley:		
6 in.	Main in Ferry street, main in Pine street	499
Rensselaer street:		
8 in.	Main in River street, main in Sixth avenue	623
River street:		
6 in.	Main in Adams street, south line of Broadway	3206
12 in.	South line Broadway, north city line	8691
12 in.	Orr's mills, main in Middleburgh street	400
6 in.	North city line, main in Cemetery avenue	151
Sausse street:		
6 in.	Main in Oakwood avenue, eastwardly	522
Second street:		
12 in.	Main in River street, main in Madison street	4847
8 in.	Main in Madison street, main in Jackson street	1123
6 in.	Main in Jackson street, junction with Burden avenue	2865

STREET.	FROM AND TO.	FEET.
Seventh street:		
8 in.	Main in Grand street, main in Ferry street	2117
6 in.	Main in Ferry street, southwardly	228
6 in.	Main in Hill street, Poestenkill	223
Seventeenth street:		
6 in.	Main in Hoosick street, main in Hutton street	944
4 in.	Main in Bank street, northwardly	101
6 in.	Main in Christie street, main in Highland avenue	123
Sheldon avenue:		
6 in.	Main in Pawling avenue, westwardly	420
Sherman avenue:		
8 in.	Main in Campbell highway, main in Sheridan avenue	311
6 in.	Main in Sheridan avenue, main in Grant avenue	272
Sheridan avenue:		
6 in.	Main in Sherman avenue, main in Thomas street	688
Sixth avenue:		
6 in.	Cemetery avenue, main in Middleburgh street	2883
24 in.	Main in Middleburgh street, south side of Rensselaer street	1123
8 in.	Main in Rensselaer street, main in Hoosick street	1169
4 in.	Main in Hoosick street, 187 feet south of State street	3947
4 in.	187 feet south of south line of State street, 2 lines, 250 feet each, Congress street	500
4 in.	Main in Jefferson street, main in Ida street	400
Sixteenth street:		
6 in.	Main in Christie street, northwardly	130
6 in.	Main in Hutton street, northwardly	248
Smith avenue:		
6 in.	Main in River street, westwardly, Hudson river	829

STREET.	FROM AND TO.	FEET.
Snyder avenue:		
6 in.	Main in Erie street, main in Mechanic street	268
South street:		
8 in.	Main in Eighth street, main in Fifteenth street	1879
Spring avenue:		
6 in.	Main in Hill street, centre of Infirmary road	771
12 in.	Main in Campbell highway, main in Maple avenue	377
8 in.	Main in Maple avenue, west line Pawling avenue	1560
State street:		
6 in.	Main in River street, 87 feet west of main in Seventh street	2131
8 in.	87 feet west of Seventh street, main in Seventh street	87
Stow avenue:		
6 in.	Main in Burden avenue, southwardly	316
8 in.	Thence to city line	174
Stow street:		
6 in.	Main in Burden avenue, westwardly to railroad	216
St. John street:		
6 in.	Main in Fourth street, eastwardly	428
St. Joseph street, Eighth ward:		
6 in.	Main in Fifth avenue, main in St. Mary's avenue	166
St. Joseph avenue, Sixth ward:		
6 in.	Main in Fourth street, eastwardly	316
St. Mary s avenue:		
3 in.	Main in Liberty street, main in Washington street	354
4 in.	Main in Washington street, main in St. Peter's avenue	335

STREET.	FROM AND TO.	FEET.
St. Peter's avenue:		
4 in.	Main in St. Mary's avenue, main in Havermans avenue	127
Tenth street:		
6 in.	Main in Middleburgh street, main in Oakwood avenue	1772
20 in.	Main in Oakwood avenue, main in People's avenue	2466
Thompson street:		
6 in.	Main in Howard street, 86 feet west of Hopkins street	436
Third street:		
12 in.	Main in River street, southwardly	50
10 in.	50 feet south of River street, south line of Congress street	1363
8 in.	South line of Congress street, south line of Liberty street	1230
4 in.	South line of Liberty street, 8 feet north of Adams street	847
6 in.	8 feet north of Adams street, main in Ida street	997
Third street:		
20 in.	Main in Ida street, main in Madison street	664
8 in.	Main in Madison street, main in Van Buren street	1583
Thirteenth street:		
6 in.	Main in Congress street, main in South street	1120
Thomas street:		
8 in.	Main in Campbell highway, main in Sheridan avenue	316
6 in.	Main in Sheridan avenue, main in Grant avenue	288
Tibbits avenue:		
20 in.	Main in Burdett avenue, main in Brunswick avenue	640
8 in.	Main in Brunswick avenue, main in Fourteenth street	916

STREET.	FROM AND TO.	FEET.
Trenton street:		
6 in.	—Main in Fourth street, eastwardly	36
Turner street:		
4 inch.	—256 feet south of Bond street, 92 feet north of Bond street	348
Twelfth street:		
6 in.	—Main in Hutton street, 317 feet south of Jacob street	1123
Tyler street:		
8 in.	—Main in First street, main in Fourth street	423
6 in.	—Main in Fourth street, Hickory street	894
Van Buren street:		
6 in.	—Main in Second street, west of First street	597
8 in.	—Main in Second street, main in Fourth street	346
4 in.	—Main in Fourth street, eastwardly	27
Vanderheyden street:		
6 in.	—Main in Fifth avenue, main in Sixth avenue	330
Van Every avenue:		
6 in.	—Main in St. Joseph street, southwardly	389
Vandenburgh avenue:		
8 in.	—Main in Mill street, main in Lark street	490
6 in.	—Main in Lark street, south city line	340
8 in.	—South city line, junction with Burden avenue	548
Walker avenue:		
6 in.	—Main in Pawling avenue, main in Collins avenue	687
Walnut street:		
6 in.	—Main in Marshall street, main in Elm street	362
Water street:		
8 in.	—Junction with Burden avenue, south and west	825
Washington street:		
6 in.	—Centre of Front street, main in River street	176
8 in.	—Main in River street, main in Fourth street	1368
6 in.	—Main in Fourth street, main in Hill street	169
4 in.	—Main in Hill street, main in Havermans avenue	503

STREET.	FROM AND TO.	FEET.
Washington place:		
6 in.—Main	in Second street, main in Third street..	332
Willis street:		
6 in.—Main	in Vandenburgh avenue, main in Lark street.....	513
Fire Hydrant Laterals:		
4 in.—Main,	fire hydrants,.....	12772

The following is a summary of the sizes and aggregate lengths of pipe :

Twenty-four inch,.....	7,132	feet.
Twenty inch.....	33,957	"
Sixteen inch.....	11,497	"
Twelve inch.....	36,647	"
Ten inch.....	4,429	"
Eight inch.....	55,268	"
Six inch.....	106,458	"
Four inch.....	29,304	"
Less than four inch.....	3,200	"
	287,892	feet.
Thirty inch force main.....	16,753	"
Total.....	304,645	feet.
Being.....	$57\frac{3685}{5280}$	miles.

LOCATION OF FIRE HYDRANTS.

Adams street.

Corner of River.
Alley between River and First.
N. W. corner of First.
Alley between First and Second.
Corner of Franklin.
Corner of Church.
N. E. corner of Third.
N. E. corner of Fourth.
Corner of William.
N. W. corner of Hill.

Alley East of Fourth street.

200 feet south of Monroe,
Corner of Hanover.

Alley North of State street.

Between Sixth avenue and Seventh.

Bank street.

278 feet east of Brunswick avenue.
Corner of Brunswick avenue.
Corner of Prospect avenue.

Bleecker avenue.

Corner of Highland avenue.
Corner of Tibbits avenue.

Bond street.

Corner of River.
Corner of President.
Corner of Turner.

Broadway.

Corner of Front.
Opposite Cannon place.
Corner of Franklin.
Corner of Church.
Corner of William.
S. E. corner of Fifth avenue.
Corner of Union.
East of Union depot.

Brunswick Turnpike.

Junction of Congress.
Middle of block.
Near city line.

Brunswick avenue.

Corner of Congress.

Burden avenue.

Corner of Main.
Corner of Centre.
Corner of Stow.
Corner of Kelly.
Corner of Cross.
Opposite Mill.
South end of Bridge.
Opposite rolling mill.
400 feet east of Stow avenue.

Burdett avenue.

Corner of Hoosick.
Corner of Hutton.
Corner of Eagle.
Corner of Jacob.

Campbell highway.

150 feet west Spring avenue.
Entrance to County House.
Foot of the hill.
Front of Smart's paper mill.
Rear entrance to County House.
Burden's farm house.
800 feet east of Thomas.
400 feet east of Thomas.
Opposite Thomas.
359 feet west of Thomas.
Opposite Sherman avenue.

Canal avenue.

N. W. corner of Third.

Centre street.

200 feet west of Burden avenue.

Cragin avenue.

S. W. corner of Glen avenue.
Opposite Park avenue.
East side at south end.

Chestnut street.

Corner of Elm.
Corner of Marshall.

Christie street.

Corner of Congress.

Collins avenue.

Corner of Walker avenue.

Congress street.

N. E. corner of River.
Alley between River and First.
Corner of First.
S. W. corner of Second.
Corner of Franklin.
N. W. corner of Fourth.
N. E. corner of Fifth avenue,
At No. 139.
Corner of Sixth avenue.
At No. 172.
At No. 217.
Corner of Farm.
At No. 271.
At No. 315.
N. E. corner of Marshall.
S. E. corner of Marshall.
At No. 377.
Opposite Spring works.
Opposite Farnam steamer house
At Collins block.

Cross street.

150 feet north of Kelly.
150 feet south of Kelly.

Cypress street.

Corner of Elm.
Opp. east road to Peckham's mill
At Wayside mill.
At end of main.

Defreest avenue.

Corner of Campbell highway.
Middle ofbl ock.
Opposite Berger lane.

Division street.

Corner of Front.
N. E. corner of River.
Alley between River and First.
N. W. corner of First.
Alley between First and Second.
Alley bet. Second and Third.
N. E. corner of Third.
Alley bet. Third and Fourth.
N. W. corner of Fourth.

Douw street.

220 feet west of President.
Corner of President.
S. E. corner of River.
S. W. corner of Sixth avenue.

Eagle street.

Corner of Thirteenth.

Eighth street.

At No. 472.
At No. 448.
Opposite North Adams.
Opposite 179.
S. E. corner of Federal.
N. W. corner of Federal

At No. 376.
At No. 304.
At No. 299.
N. E. corner of Hutton.
N. E. corner of Eagle.
Opposite Eagle.
N. W. corner of Jacob.
At No. 183.
Corner of Grand.
Corner of Fulton.
At N. end Polytechnic Institute.
At S. end Polytechnic Institute.
At No. 38.
Opposite South.
Corner of Congress.

Eleventh street.

74 feet south of Jacob.
N. E. corner of Middleburgh.
Corner of Eagle.
S. E. corner of Ingalls avenue

Elm street, Sixth ward.

Corner of Prince.

Erie street.

In angle opposite Mill.
Opposite Howard.
Corner of Snyder avenue.

Factory road.

362 feet east of Hill.

Farm street.

Corner of Russell.

Federal street.

Opposite Front.
N. W. corner of River.
N. E. corner of River.
S. W. corner of Fifth avenue.
S. W. corner of Sixth avenue.
Opposite North Fourth.

Ferry street.

N. E. corner of Front.
S. E. corner of Front.
N. E. corner of River.
Alley between River and First.
N. E. corner of First.
Alley between First and Second.
Alley between Second and Third.
Alley between Third and Fourth.
Alley between Fourth and Fifth avenue.
Opposite Read's alley.
Corner of Sixth avenue.
At No. 171.
At No. 193.
Junction of Congress.

Fifth avenue.

175 feet north of Rensselaer.
S. W. corner of Rensselaer.
Corner of Jay.
Corner of Vanderheyden.
N. E. corner of Hoosick.
Opposite No. 2336.
S. W. corner of Hutton.
At No. 2255.
Corner of Jacob.
At Christ Church.
N. W. corner of Federal.
N. W. corner of Fulton.
N. W. corner of Broadway.
Corner of State.
N. W. corner of Congress.
N. W. corner of Ferry.
At No. 1457.
N. W. corner of Liberty.
S. W. corner of Liberty.
Junction of Hill.
Corner of alley between Fifth avenue and Hill.
Corner of Canal avenue.

Fifteenth street.

Corner of Eagle.
Corner of Jacob.
Corner of South.
Corner of Tibbits avenue.
Corner of Christie.
Corner of Marshall.

First street.

Corner of State.
S. E. corner of Congress.
N. W. corner of Ferry.
N. W. corner of Division.
N. W. corner of Washington.
N. E. corner of Adams.
Corner of Jefferson.
Corner of Canal avenue.
Corner of Madison.
N. E. corner of Jackson.
At No. 397.
Corner of Van Buren.
At No. 436.
Corner of Harrison.
At No. 480.
Corner of Tyler.
Opposite No. 519.
Junction of Second.

Fourteenth street.

Corner of Hutton.
Corner of Eagle.
Corner of Jacob.
Corner of People's avenue.
Corner of South.
Corner of Christie.
Corner of Marshall.

Fourth street.

S. W. corner of Grand.
Corner of Fulton.
Corner of Broadway.
Corner of State.
At No. 404.
S. W. corner of Monroe.
Opposite Hanover.
Corner of Jackson.

S. E. corner of Congress.
Corner of Ferry.
N. W. corner of Division.
Corner of Liberty.
N. W. corner of Washington.
N. W. corner of Adams.
Corner of Jefferson.
Corner of Canal avenue.
At No. 370.
Corner of Madison.
Opposite Trenton.
Opposite Van Buren.
Opposite Lincoln avenue.
Corner of Harrison.
Corner of Tyler.
Opposite St. Joseph avenue.
Corner of Polk.
Opposite St. John.
Opposite Main.

Frear avenue.

227 feet west of Oakwood avenue.
445 feet west of Oakwood ave.

Fulton street.

N. W. corner of River.
Corner of Church.
Corner of William.
S. E. corner of Fifth avenue.
N. E. corner of Union.
S. E. corner of Union.
East of Union depot.

Front street.

Opposite Coutie's shop.
N, E. corner of Grand.
S. W. corner of Grand.
At Warner's building.
Corner of Fulton.
S. E. corner of Broadway.
S. E. corner of Congress.
S. W. corner of Congress.

Glen avenue.

430 feet west of River.
130 feet west of River.
Opposite Cragin avenue.
At Fitchburg R. R.

Grand street.

N. E. corner of Fourth.
Corner of Fifth avenue.
Opposite Union.
Corner of Sixth avenue.
Alley bet. Sixth avenue and Seventh.
Opposite Seventh.

Grant avenue.

Corner of Thomas.
Middle of block.
Corner of Sherman avenue

Green street.

Midway bet. Rensselaer and North.

Hanover street.

Corner of Bedford.

Harrison place.

N. E. corner of Federal.
Opposite School No. 5.
S. W. corner of Jacob.
674 feet north of Jacob.

Havermans avenue.

Southerly end.

Highland avenue.

Corner of Brunswick avenue.
At No. 33.
At No. 3.

Hill street.

S. W. corner of Liberty.
Corner of Washington.
South of Union R. R.
Opposite Adams.
At No. 105.
Opposite Jefferson.
Corner of Seventh.
At 192.
North side at bridge.
South side at bridge.

Hoosick street.

S. E. corner of Fifth avenue.
Corner of Green.
N. W. corner of Sixth avenue.
N. W. corner of Eighth.
N. E. corner of Eighth.
Corner of Sixteenth.
Corner of Seventeenth.
Corner of Eighteenth.
Corner of Nineteenth.

Hopkins street.

Corner of Thompson.

House avenue.

Corner of Tenth.

Howard street.

Opposite Mechanic.

Hutton street.

N. E. corner of River.
Corner of North First.
N. E. corner of Fifth avenue.
Corner of Green.
N. W. corner of Sixth avenue.
S. E. corner of Eighth.
Corner of Twelfth.
Corner of Fifteenth.
Corner of Sixteenth.
Corner of Seventeenth.

Ida street.

Corner of alley west of First.
Corner of First.
S. E. corner of Second.
Corner of Third.
Corner of Fourth.
Corner of Fifth avenue.
Midway between Sixth avenue and Seventh.
Corner of Seventh.

Ingalls avenue.

Opposite President.
N. W. corner River.
Corner of Sixth avenue.
Corner of North Fourth.
Corner of Orrs.

Institute avenue.

273 feet south of Broadway.

Jackson street.

188 feet west of First.
N. W. corner of First.
N. W. corner of Third.

Jacob street.

N. E. corner of River.
Corner of Sixth avenue.
S. E. corner of North Fourth.
N. E. corner of Eighth.
Corner of Tenth.
Corner of Eleventh.
Corner of Twelfth.
Corner of Thirteenth.
Corner of Sixteenth.

Jefferson street.

S. E. corner First.
Alley between First and Second.
Alley bet. Fourth and Fifth ave.
Corner of Fifth avenue.
Corner of Sixth avenue.

Kelly street.

S. E. corner Cross.

King street.

At No. 110.
Corner of Jacob.
At No. 34.

Lansing avenue.

Midway. bet. Walker and Maple avenue.

Lark street.

Near city line.
Corner of Willis.

Liberty street.

S. E. corner of Front.
N. E. corner of Front.
N. E. corner of River.
Alley between First and River.
Corner of First.
Alley between First and Second.
N. W. corner of Second.
Corner of Franklin.
Corner of Church.
N. E. corner of Hill.
Corner of St. Mary's avenue.

Lincoln avenue.

S. E. corner of Fourth.
N. W. corner of Hudson.
175 feet east of Hudson.
S. W. corner of Francis.

Linden avenue.

Corner of Pawling avenue.
250 feet west of Pawling avenue.
500 feet west of Pawling ave.
At Marshall Infirmary.

Locust avenue.

Corner of Pawling avenue.
400 feet west of Pawling ave.

Madison street.

N. W. corner of River.
N. E. corner of River.
Alley between First and Second.
Alley between Second and Third.
Alley bet. Third and Fourth.
Alley between Fourth and Fifth avenue.
Corner of Fifth avenue.

Main street.

Alley between Second and River.

Mann avenue.

Corner of Fourth.
Corner of Willow.
Corner of Hudson.

Maple avenue.

Corner of Spring avenue.
Corner of Pawling avenue.
Middle of block.
Corner of Lansing avenue
Corner of Collins avenue.

Mechanic street.

Opposite Hopkins.

Mill street.

At Albany Iron Works office.
At Albany Iron Works barn.
At No. 4.
N. W. corner Erie.
At Woodside church.
100 feet east of Stanton house.
At Reading Room.
At bridge.
Opposite Vandenburgh avenue.

Middleburgh street.

N. E. corner of River.
N. E. corner of Sixth avenue.
N. W. corner of North Fourth.
Opposite North Fourth.
North side, west of railroad.
S. E. corner of Eighth.

Monroe street.

307 feet west of River.
Corner of River.
Alley between River and First.
Corner of First.
S. W. corner of Second.
Corner of Third.
Alley bet. Third and Fourth.
S. W. corner of Fourth.
Alley between Fourth and Fifth avenue.

Mount street.

Corner of Ingalls avenue.
Corner of Middleburgh.
Corner of North.

Myrtle avenue.

Corner of Spring avenue.
Corner of Pawling avenue.
At No. 23.

Ninth street.

Corner of House avenue.
At No. 7 Sunnyside.
At No. 3 Sunnyside.
At L. Burton's.
Corner of Ingalls avenue.
N. W. corner of Middleburgh.
S. W. corner of Middleburgh.
At No. 371.
At No. 345.
At No. 325.
Corner of North Adams.
At No. 281.
At No. 253.
Corner of Hoosick.
At No. 211.
Rear Troy Orphan Asylum.
Corner of Hutton.
Corner of Eagle.
Corner of Jacob.
Opposite People's avenue.
Corner of Federal.
130 feet south of Federal.

North street.

S. E. corner of River.
N. E. corner of River.
Opposite Mount.

North Fourth street.

278 feet north of Glen avenue.
N. W. corner of Glen avenue.
S. W. corner of Glen avenue.
Opposite Park avenue.
At old gas works.
Corner of Douw.
Midway in block between Ingalls avenue and Douw.
N. E. corner Ingalls avenue.
Corner of Hoosick.
At No. 153.
At No. 135.
N. E. corner of Hutton.
S. W. corner of Hutton.
N. of R. R. crossing.
S. of R. R. crossing.
N. E. corner of Jacob.
S. W. corner of Jacob.
At No. 27.
N. W. corner of Federal.

Oakwood avenue.

Corner of Frear avenue.
At W. J. Simmons'.
At E. Lecomte's.
Corner of Middleburgh.
At S. Bailey's.
Opposite R. Chichester's.
Opposite No. 36.
Opposite Sausse.
Corner of Archibald.

Orrs street.

Corner of Ingalls avenue.
233 feet north of Ingalls avenue.
509 feet north of Ingalls ave.

Park avenue.

N. E. corner of North Fourth.
At No. 18.

Pawling avenue.

East of Memorial church.
At No. 6 Dale View.
Junction Pine Woods avenue.
Opposite J. H. Hunnington's.
At No. 177.
At No. 198.
At No. 218.
Opposite Walker avenue.
N. W. corner Maple avenue.

People's avenue.

Corner of Tenth.
Corner of Twelfth.
Corner of Thirteenth.
Corner of Burdett avenue.

Pine Woods avenue.

Corner of Belle avenue.
Opposite No. 40.
Corner of Lake.

President street.

Bet. Ingalls avenue and Douw.

Polk street.

Corner alley, Second and River. Opposite alley east of Second.

Prospect avenue.

300 feet south of Bank.

Read's alley.

Corner of Pine.

Rensselaer street.

N. E. corner of River.
N. W. corner of North First.
N. W. corner of Sixth avenue.

River street.

At north city line.
N. E. corner of Glen avenue.
S. W. corner of Glen avenue.
Opposite Bond.
Opposite Smith avenue.
N. E. corner of Douw.
At No. 744.
S. W. corner of Middleburgh.
At Mount Vernon Mills.
At No. 677.
At No. 662.
S. E. corner of Rensselaer.
At No. 608.
Corner of Jay.
At No. 576.
Corner of Vanderheyden.
At No. 546.
N. W. corner of Hoosick.
N. E. corner of Hoosick.
At No. 508.
N. E. corner of Hutton.
S. W. corner of Hutton.
At No. 459.
At Northern hotel.
S. E. corner of Jacob.
Front of Manufacturers' bank.
At No. 395.
N. E. corner of Federal.
N. W. corner of Grand.
At No. 338.
N. W. corner of Fulton.
Corner of Third.
Alley bet. Second and Third.
Corner of Second.
At No. 261.
Corner of Broadway.
Corner of First.
At No. 227.
Corner of State.
At No. 177.
N. E. corner of Congress.
S. W. corner of Congress.
At No. 139.
N. E. corner of Ferry.
N. W. corner of Division.
N. W. corner of Liberty.
N. E. corner of Washington,
Opposite Bell foundry.

Sausse street.

East end.
Middle of block,

Second street.

N. E. corner of Broadway.
S. E. corner of Broadway.
S. E. corner of State.
S. E corner of Congress.
N. W. corner of Ferry.
S. E. corner of Ferry.
N. W. corner of Division.
S. E. corner of Division.
S. E. corner of Liberty.
N. W. corner of Washington.
S. E. corner of Washington.
N. E. corner of Washington place.
N. E. corner of Adams.
S. E. corner of Adams.
Corner of Jefferson.
At railroad crossing.
N. E. corner of Ida.
Corner of Canal avenue.
At. No. 314.
N. E. corner of Madison.
S. E. corner of Madison.
At No. 350.
N. E. corner of Monroe.
S. E. corner of Monroe.
At No. 388.
Corner of Jackson.
Corner of Van Buren.
At No. 468.
Corner of Harrison.
At No. 510.
Corner of Tyler.
Corner of Polk.
At No. 563.

Seventeenth street.

Between Hoosick and Hutton.
Opposite Christie.

Seventh street.

Corner of Fulton.
Corner of Broadway.
N. W. corner of State.
S. W. corner of State.
Corner of Congress.
60 feet south of Congress.
Corner of Ferry.
200 feet south of Ferry.
Corner of Hill.

Sheldon avenue.

400 feet west of Pawling avenue.

Sheridan avenue.

Midway bet. Thomas and Sherman aves.

Sherman avenue.

Opposite Sheridan avenue.

Sixteenth street.

Corner of Christie.

Sixth avenue.

At north city line.
At No. 3326.
N. E. corner of Glen avenue.
S. W. corner of Glen avenue.
At No. 3247.
At No. 3151.
S. W. corner of Douw.
Corner of Ingalls avenue.
N. W. corner of Middleburgh.
N. W. corner of North.
Opposite North.
Opposite 2778.
At No. 2735.
N. W. corner of Rensselaer.
Corner of Jay.
Corner of Vanderheyden.
S. W. corner of Hoosick.
S. W. corner of Hutton.
Opposite 2154.
N. W. corner of Federal.
N. W. corner of State.
Corner of Ida.

Smith avenue.

Corner of River.
Corner of President.
Corner of Turner.

South street.

At No. 25.
At No. 47.
At No. 73.

Spring avenue.

Opposite Stoll's brewery.
Corner Infirmary road.
Opposite Orphan asylum.
Corner of Pawling avenue.
300 feet east of Orphan asylum.

State street.

Alley between First and River.
Alley between First and Second.
S. W. corner of Second.
Alley bet. Second and Third.
Alley bet. Third and Fourth.
N. W. corner of Sixth avenue.

St. John street.

300 feet east of Fourth.

St. Joseph street.

Corner of St. Mary's avenue.

St. Joseph street (South Troy).

Corner of Willow.

Stow avenue.

Corner of Burden avenue.
At south city line.
Corner of Burke.

Stow street.

200 feet west of Burden avenue.

Tenth street.

Corner of Middleburgh.
At No. 447.
At No. 425.
At No. 403.
Corner of North Adams.
At No. 351.
At No. 327.
Corner of Hoosick.
At No. 285.
Rear of hospital of Little Sisters.
Corner of Hutton
Corner of Eagle.

Third street.

S. W. corner of Fulton.
N. W. corner of Broadway.
S. W. corner of Broadway.
N. E. corner of State.
S. W. corner of State.
N. W. corner Congress.
S. E. corner of Congress.
N. W. corner of Ferry.
S. E. corner of Ferry.
N. W. corner of Division.
Corner of Liberty.
N. W. corner of Washington.
N. W. corner of Adams.
Opposite No. 255.
N. E. corner of Jefferson.
S. W. corner of Jefferson.
Corner of Madison.
N. E. corner of Jackson.

Thirteenth street.

Corner of South.
Corner of Farm.
At No. 48.
Corner of Christie.
Corner of Congress.

Thomas street.

Opposite Sheridan avenue.

Thompson street.

Opposite Howard.

Tibbits avenue.

Corner of Fourteenth.
Corner of Sixteenth.
Corner of Brunswick avenue.
At I. Hayner's.

Twelfth street.

Corner of Eagle.
275 feet south of Jacob.

Turner street.

South end of street.

Tyler street.

Corner of Willow.
Corner of Hickory
S. E. corner of First.

Van Buren street.

252 feet west of First.
Alley between First and Second.
Alley bet. Second and Third.
N. W. corner of Third.

Vandenburgh avenue.

At south city line.
Opposite Willis.
Opposite Lark.

Van Every avenue.

389 feet south of St. Joseph.

Walker avenue.

Corner of Lansing.

Walnut street.

Corner of Elm.
Corner of Marshall.

Washington street.

N. E. corner of Front.
S. E. corner of Front.
N. E. corner of River.
Alley between River and First.
S. E. corner of First.
Alley between First and Second.
N. E. corner of Third.
N. E. corner of Fourth.
Corner of St. Mary's avenue.

Washington place.

Centre of block.

Water street.

Corner of Burden avenue.
Corner of Elm.
Junction of Lennon.

Willis street.

In angle opposite Vandenburgh ave.

Total number of fire hydrants..... 717

In addition to the above there are also two fire hydrants at the pumping station in Lansingburgh.

PRIVATE FIRE HYDRANTS.

At Burden Iron Co., lower works	5
At Burden Iron Co., upper works	2
At Clinton Foundry	2
At J. A. Eddy's, Glen avenue	2
At W. H. Frear's, Oakwood avenue	1
At Fitchburg R. R., Adams street	1
At Fitchburg R. R., machine shop	1
At Marshall Infirmary	2
Marshall estate, at Kellogg's office	1
At Old Bell Foundry, Adams street	1
At N. Y. C. & H. R. R. R. Co.'s machine shop	1
At Orr & Co.'s paper mill	1
At Orr & Co.'s storehouse	1
At Oakwood foundry	1
At Rensselaer County House	6
At Troy Gas Co.'s works, Hill street	1
At Troy Gas Co.'s works, Smith avenue	1
At Troy Steel & Iron Co.'s machine shop	1
At J. M. Warren's, Eighth street	1
At Warren Bros., Ida Hill	1
Total	33

INVENTORY.

PIPE, SPECIALS AND VALVES.

Size.	Pipe.	4 Ways.	3 Ways.	Reducers.	Bends.			Sleeves.	Caps.	Offsets.	Plugs.	Valves.	Pieces.	Y's.
					1/4	1/8	1-16							
30	6	..	..	..	..	..	6	7	..	..	..	..	..	..
24	4	..	..	..	..	..	..	4	..	..	..	..	..	..
x24	..	..	1	..	..	..	..	..	..	..	..	..	..	..
x20	..	..	..	1	..	..	..	..	..	..	..	..	..	..
x16	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x12	..	..	..	1	..	..	..	..	..	..	..	..	..	..
x 8	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x 6	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x 4	..	..	2	..	..	..	..	..	..	..	..	..	..	..
20	41	..	..	..	..	2	..	5	1	..	..	..	..	..
x20	..	1	1	..	..	..	..	..	..	..	..	..	..	..
x16	..	1	..	1	..	..	..	..	..	..	..	..	..	..
x12	..	1	..	..	..	..	..	..	..	..	..	..	..	..
x10	..	1	..	..	..	..	..	..	..	..	..	..	..	..
x 8	..	2	..	..	..	..	..	..	..	..	..	..	..	..
x 6	..	2	2	..	..	..	..	..	..	..	..	..	..	..
x 4	..	..	8	..	..	..	..	..	..	..	..	..	..	..
16	4	..	..	..	..	..	..	3	1	..	..	..	1	..
x16	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x12	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x10	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x 8	..	2	4	1	..	..	..	..	..	..	..	..	..	..
x 6	..	3	4	..	..	..	..	..	..	..	..	..	..	..
x 4	..	..	10	..	..	..	..	..	..	..	..	..	..	..
12	5	..	..	..	..	3	2	3	9	..	2	..	12	..
x12	..	1	1	..	..	..	..	..	..	..	..	..	..	..
x10	..	..	..	1	..	..	..	..	..	..	..	..	..	..
x 8	..	7	5	7	..	..	..	..	..	..	..	..	..	..
x 6	..	3	6	1	..	..	..	..	..	..	..	..	..	..
x 4	..	2	4	..	..	..	..	..	..	..	..	..	..	..
10	20	..	..	..	..	..	..	5	6	..	..	..	2	..
x10	..	1	1	..	..	..	..	..	..	..	..	..	..	..
x 8	..	1	1	1	..	..	..	..	..	..	..	..	..	..
x 6	..	..	5	2	..	..	..	..	..	..	..	..	..	..
x 4	..	2	11	..	..	..	..	..	..	..	..	..	..	..
8	39	..	..	..	11	1	11	1	2	..	..	..	4	..
x 8	..	24	8	..	..	..	..	..	..	..	..	..	..	..
x 6	..	19	11	5	..	..	..	..	..	..	..	..	..	..
x 4	..	9	6	12	..	..	..	..	..	..	..	..	..	..
6	29	..	..	..	25	3	..	7	14	7	22	..	10	..
x 6	..	16	6	..	..	..	..	3Split	..	..	..	..	..	1
x 4	..	5	4	..	..	..	..	..	..	..	..	..	..	..
4	13	..	..	..	22	32	..	24	30	10	..	2	24	..
x 4	..	9	11	..	..	..	..	6Split	..	..	..	..	..	..
x 3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	..	..	..	..	8	..	..	6	..	..	..	..	..	..

LEAD PIPE.

2-inch AA	5 coils.
1½-inch AA	17 "
1¼-inch AA	8 "
1-inch AA	30 "
¾-inch AA	50 "
½-inch AA	4 "
Total	114 coils.

SUPPLIES.

Pig lead	lbs. 8,000	1½ in. wood screws	1,920
Solder	" 219	2-in brass bolts	300
Solder metal (old)	" 781	S. C. box screws	116
Tarred yarn	" 20	F. H. rod bolts	116
Packing yarn	" 13	Wash hydrant couplings	5
Washer leather	" 6	Stop-cock box bottoms	70
Rubber packing	" 22	" " tops	93
Cotton wicking	" 1¼	" " extensions	90
Packing paper	" 9	Gate box tops	5
Nails	" 99	" bottoms	6
Yard hydrants complete	17	" covers	28
" " valves	6	Fire hydrant chain	ft. 17
" " tubes	59	" top bolts	41
" " elbows	66	" couplings	2
" " spouts	314	Ludlow hydrant washers	3
" " cranks	227	Wood, "cords"	¾
" " caps	44	Charcoal	bush 25
" " rods	84	Coke	" 40
" " posts	11	½ bbl. resin.	
" " tail pieces	21	2 brooms.	

BRASS GOODS.

Taps, 2 inch	1	Cocks, 2 inch	1
" 1½ inch	14	" 1½ inch	6
" 1¼ inch	36	" 1¼ inch	15
" 1 inch	54	" 1 inch	100
" ¾ inch	95	" ¾ inch	4
20-inch valve stem	1	1½ inch valve	1
8 " "	5	8-inch valve covers	5
6 " "	4	6 " "	4
4 " "	3	Float valves	6
3 " "	1		

METERS.

3	inch, Thomson.....	1	1	inch Terry.....	1
2	" Crown.....	1	1	" Union rotary...	1
2	" Union rotary....	1	¾	" Crown.....	1
2	" Gem	1	¾	" Worthington....	1
1½	" Crown.....	2	½	" Crown....	1
1½	" Worthington....	1			

PIPE TOOLS AND EQUIPMENTS.

1 tripod derrick,
2 2-ton chain blocks,
1 1½-ton chain block,
1 1-ton chain block,
1 "triple set" block,
4 single set blocks,
1 3-inch pulsometer,
1 No. 3 diaphragm pump,
1 2½-inch syphon,
4 lengths 4-inch rubber suction,
7 3-inch bilge pumps,
6 lengths cotton hose,
1 fire hydrant reducer,
4 wooden pails,
1 blasting dynamo and wire,
1 lot of blasting timbers,
3 sledge hammers,
8 striking hammers,
7 steel bars,
14 rammers,
4 hammer drills,
1 4-foot bracing saw,
27 pieces of chain.
3 melting furnaces,
5 large lead keetles,
2 small lead kettles,
3 pouring kettles,
3 ladle shanks,
3 pouring chains,
2 ladles,
5 sets calking tools,
6 calking hammers,
3 yarning irons,
5 cold chisels,
5 dog chisels,
20 diamond points,
1 24-inch pipe jointer,
1 20-inch pipe jointer,
1 16-inch pipe jointer,
2 12-inch pipe jointers,
1 10-inch pipe jointer,
2 8-inch pipe jointers,
2 6-inch pipe jointers,
2 4-inch pipe jointers.
4 pipe ropes.

SHOP TOOLS AND EQUIPMENTS.

1 8-inch engine lathe,
1 open lathe,
2 bench vises,
2 pipe vises,
1 platform scale,
2 boilers for thawing,
2 force pumps,
4 yard hydrant keys,
2 pairs hip boots,
4 pairs short boots,
2 pair 2-inch pipe tongs,
1 pair 1½-inch pipe tongs,
1 pair 1½-inch pipe tongs,
1 pair 1-inch pipe tongs,

2 hand pumps,
25 feet ¾ rubber hose,
48 pounds tin tubing,
2 pressure gauges,
3 tapping machines,
2 extra gaskets for same,
1 grindstone,
1 ratchet drill,
1 breast drill,
1 Tasker stock and dies,
1 ratchet stock and dies,
1 2-inch pipe cutter,
2 chain tongs,
2 hand saws,
1 draw knife,
1 plane,
1 square,
1 claw hammer,
1 bevel,
7 augers,
1 trowel,
1 hoe,
2 iron jackscrews,
1 large thawing boiler,
18 globe lanterns,
1 100-foot tape,
1 clock,
2 coal hods,
5 fire hydrant wrenches,
6 street keys,
6 sidewalk keys,
3 fire hydrant keys,
1 pair ¾-inch pipe tongs,
1 20-inch monkey wrench,
1 16-inch monkey wrench,
1 14-inch monkey wrench,
1 12-inch monkey wrench,
1 10-inch monkey wrench,
1 set small S wrenches,
2 charcoal furnaces,
2 plumbers' melting kettles,
1 plumbers' ladle,
2 sets small calking tools,
2 torches,
1 kit plumbers' tools,
3 copper bolts,
2 chisels,
2 bit braces,
2 axes,
3 picks,
4 shovels,
3 scoops,
2 paving rammers,
2 paving hammers,
6 pounders,
1 step ladder,
1 anvil,
1 forge,
2 hammers,
1 lot of tongs,
6 wheelbarrows,
35 wooden horses,
29 2-inch planks "long,"
18 2-inch planks "short."

BARN.

3 horses,
6 blankets.
2 canvas covers,
1 lap blanket,
2 sets of single harness,
1 set of double harness,
3 truck wagons,
1 open wagon,
1 bob sleigh,
1 set mason bobs,
2 pails,
7 boxes axle grease, brooms, brushes, scoop, shovel, etc.

RESERVOIR.

1 double wagon.

PUMPING STATION.

MAIN BUILDING.

2 set Holley pumping engines,
2 donkey pumps,
5 steam radiators,
1 clock,
2 tables,
4 chairs,
3 spittoons,
3 slates,
1 log book,
13 log books, old,
2 requisition books,
6 rubber mats,
1 work bench,
1 bench vise,
1 steam damper regulator,
1 card indicator,
1 test pump and gauge,
1 hose carriage,
1 hose pipe,
250 feet 2½ inch leather hose,
100 feet ¾ inch rubber hose,
1 pipe-fitter bench,
2 pipe-fitter vises,
1 set pipe dies,
1 set pipe taps,
1 set pipe tongs,
2 pipe cutters,
12 lengths of pipes,
25 pipe fittings,
1 radial drill,
1 set of drills,
1 chuck for drill,
2 jack screws,
4 crowbars,
1 chain tackle,
20 cold chisels,
8 files,
1 hand saw,
2 planes,
1 bit brace,
1 extension bit,
2 gland wrenches,
7 open wrenches,
2 box wrenches,
2 screw drivers,
1 barometer,
1 thermometer,
1 axe,
2 pairs of oars,
1 grindstone,
1 pail,
1 bolt extractor,
2 step ladders,
1 bbl. cylinder oil,
20 gallons lard oil,
15 lbs. bearing grease,
5 lbs. tallow,
1 brass oil tray,
2 brass oil cans,
3 steel oil cans,
2 engine regulators,
1 ratchet,
1 patent oil can.

BOILER ROOM.

12 eye bolts,
100 bolts,
150 rubber valves, new,
450 rubber valves, old,
15 valve cages,
8 valve seats,
8 copper drip pans,
2 copper hammers,
1 hand shears,
1 hand bellows,
4 brooms,
4 packing hooks,
3 brass nuts,
3 valves and seats for steam cylinder,
4 exhaust seats for steam cylinder,
1 high wooden horse,
1 8-inch flange pattern.
1 manhole pattern,
1 handhole pattern,
6 hand lanterns,
1 window brush,
15 washers,
7 socket wrenches,
1 windlass,
2 hand hammers,
3 sledge hammers,
2 pieces 14-inch suction pipe,
1 20x14x14 tee,
6 boilers and equipment,
1 donkey boiler,
2 shovels,
3 wheelbarrows, iron,
1 portable forge,
1 anvil,
1 clock,
1 wardrobe,
1 bench,
1 slate,
8 feet ¾ inch hose,
3 water pails,
1 broom,
5 slice bars,
2 clinker rakes,
1 lazy bar,
1 wash sink,
2 hand lanterns,
4 hand lamps,
1 3¾ inch flue brush,

COAL ROOM.

1 coal screen,
2 coal buckets,
1 car coal transmitter,

COAL HOISTING ENGINE ROOM.

1 hoisting engine,
1 hoisting steel cable,

STORE ROOM WEST OF MAIN BUILDING.

1 lawn mower,
2 garden rakes,
1 scythe,
1 stable broom,
1 pick,
2 shovels,
1 saw,
1 wooden shovel,
1 spade,
¾ bbl. kerosene oil,
7 slings,
2 pairs blocks and tackle,
5 bbls. fire clay,
3 bbls. fire sand,
350 fire bricks

ON GROUND OUTSIDE.

1 24-inch sleeve,	5 wooden horses,
1 30x24 Y,	30 planks,
1 24-inch pipe,	1 boat,
1 lawn roller,	$813\frac{1}{2}\frac{0}{2}\frac{6}{4}\frac{9}{0}$ tons coal.

Respectfully submitted,

SAMUEL O. GLEASON,
DENNIS J. WHELAN,
RICHARD F. HALL,
DAVID C. BRIGGS,
} *Water Commissioners.*

WATER COMMISSIONERS' OFFICE,

Troy, N. Y., March, 1893.

ORDINANCE

In Relation to the Water Works of the City of Troy.

Passed May 7th, 1885.

The City of Troy, in Common Council convened, ordains as follows:

Section 1. It shall be unlawful for any person or persons to open any fire plug appurtenant to the water works of said city, or to draw water therefrom, excepting the water commissioners and persons under their direction or with their permission, and the chief engineer of the fire department, and the members of a fire engine or hose company, under his direction, and for the purpose of extinguishing fire or for cleaning their engines or hose, or for the purpose of making trials of their engines at a meeting of the company having charge of such engine, which trial must be had under the immediate supervision of the chief engineer or one of his assistants.

Sec. 2. It shall be unlawful for any person or persons upon whose premises a regular annual water rent shall be assessed, or who shall duly take water by special rates, for the use of his, her or their dwelling house, store or premises, to let the water run from his, her or their hydrants unneccessarily to waste, or to make use of it, or allow it to be used for any other purpose than that for which it was assessed or duly taken. This section shall not be construed to prevent such takers from using the water with a brush or broom to wash their windows, stoop or sidewalk.

Sec. 3. It shall be unlawful for any person or persons upon whose premises a regular water rate shall be assessed, or who shall duly take water by special rates, to make or allow to be made any addition or additions whatever in or about any conduit pipe or stop-cock on such premises, unless the same be made by the permission and under the direction of the said superintendent.

Sec. 4. All persons upon whose premises a regular water rate is assessed, or who shall duly take water by special rates, shall, at all reasonable times permit the superintendent of said water works and all persons employed by him or by the water commissioners, to enter

in and upon such premises to examine the pipes and apparatus thereon, and the manner in which water is used on such premises.

SEC. 5. It shall be unlawful for any person or persons, except the said superintendent and those employed by him or by the water commissioners, to tap or make any connection with the main or distributing pipes of said water works, or to permit the same to be done, except as aforesaid.

SEC. 6. It shall be unlawful for any person or persons to fish in the water works lakes or reservoirs, in said city of Troy, or in the town of Brunswick, or in either of said lakes or reservoirs, with hook, net, or in any other manner, or throw into or upon the waters of said reservoirs, or lakes, or either of them, any stones, wood, or other substance, and it shall be unlawful for any person, or persons, to enter or remain upon the lands or waters belonging to the city of Troy, and used in connection with the water works system, without the permission of the water works commissioners or their authorized agents.

SEC. 7. It shall be unlawful for any person or persons upon whose premises a regular water rate is assessed, or who shall duly take water by special rates, after the water has been shut off from such premises for cause, to let on the water, or to let the water run from his, her or their hydrants, or to authorize, cause, suffer or permit the water to be let on, except the same be done by or under the direction of said superintendent.

SEC. 8. It shall be unlawful for any person or persons not residing in or occupying the dwelling house, store or premises for the use of which a water rate is regularly assessed, or water is duly taken, to draw, use or take away water from any hydrant on such premises, without the consent of the owner or owners thereof.

SEC. 9, It shall be unlawful for any person or persons, in paving or relaying sidewalks, to pave over and conceal the stop-cock boxes attached to laterals, but in every instance where it is desired to raise the grade of a sidewalk above the top of the stop-cock boxes, notice shall be given by the owner of the premises to the superintendent of the water works, in order that he may lengthen out the stop-cock box to conform to the new grade.

SEC. 10. It shall be unlawful for any person or persons to place or deposit any building material, rubbish or any other obstruction in front of any of the city fire plugs so as to prevent ready access to the same by the fire department.

SEC. 11. Every person who shall violate any of the provisions, conditions or prohibitions in this ordinance contained, shall, upon conviction thereof by and before the police magistrate of the city of Troy, be punished for each and every such offense, by a fine not less than $5 nor exceeding $25, or by imprisonment in the common jail of the county of Rensselaer for a period not less than three days nor more than ten days, or by both such fine and imprisonment in the discretion of such magistrate.

SEC. 12. All ordinances heretofore passed by this Board in relation to the Troy Water Works are hereby repealed; but such repeal shall not in any manner affect any penalty already incurred under said ordinances, or any action commenced for the violation of said ordinances.

SEC. 13. This ordinance shall take effect immediately.

A LAW

RELATIVE TO MAKING EXCAVATIONS IN THE PUBLIC STREETS, AVENUES, HIGHWAYS, SQUARES AND ALLEYS IN THE CITY OF TROY FOR PURPOSES CONNECTED WITH THE WATER WORKS SYSTEM AND REQUIRING THE TAKING OUT OF PERMITS THEREFOR.

PASSED December 20, 1888.

The City of Troy, in Common Council convened, does hereby enact as follows:

SECTION 1. It shall not be lawful for any person to make or cause to be made any hole or excavation in, across or through any public street or sidewalk within the corporate limits of the city of Troy, for the purpose of connecting with or tapping a public water main, or laying, renewing, repairing or thawing out any water pipe, or any hydrant, without first giving a bond and obtaining a permit as hereinafter provided. The bond required shall be executed and filed at the office of the Board of Water Commissioners in said city, and shall be signed by the property owner for whom any such work is to be done, or by his agent thereunto duly authorized, in writing, and also by another person who is a resident of said city, and shall make an affidavit that he is worth the sum of five hundred dollars over and above all his debts and liabilities, and it shall be conditioned to indemnify and save harmless the city of Troy from all loss, damage and cost of every name and nature by reason of the carrying on and doing of said work, and also to restore the pavement and sidewalk which may be disturbed by such work to their proper grade and to keep the same to grade for a period of six months after the completion of such work. Whenever such a bond shall be given the Superintendent of the Water Works may issue a permit, signed by him, authorizing such work to be done. Such permit shall also provide that the work shall be performed according to the rules and regulations of the Water Commissioners in respect thereto and that all materials used therein must conform to the requirements of such rules and regulations.

SEC. 2. It shall be the duty of the Superintendent of the Water Works to examine all places where excavations have been made in the public roads under any permit as aforesaid, and where the pavement and sidewalk do not conform to grade because of the

doing of such work, to notify the property owner to cause repairs to be made, and in case of his neglect, to have such work done and the bond given by such property owner placed in charge of the corporation counsel to be duly enforced by him on behalf of the city.

SEC. 3. Any person, or the officers, agents or employees or any company or corporation who shall violate any of the provisions of section one, shall, upon conviction of such offense before the police magistrate or the assistant police magistrate, be punished by a fine of not less than twenty-five dollars nor more than fifty dollars, or by imprisonment in the county jail not less than five days nor more than ten days, or by both such fine and imprisonment in the discretion of such magistrate.

SEC. 4. The word "person" as used herein shall be held to include "company" and "corporation," and the word "street" shall include all public roads, highways, avenues, squares and alleys.

SEC. 5. This ordinance shall take effect on the first day of January, 1889.

BY-LAWS AND REGULATIONS.

For the protection, preservation and maintenance of the Water Works, and the use and control of the water supplied under the Act of the Legislature, entitled "An Act in relation to the Troy Water Works," passed March 9, 1855, and acts amendatory thereof, made by the Water Commissioners of said city, and approved by the Common Council thereof, according to the provisions of said act, on the 20th day of June, 1889.

Annual water rents, when payable.

1. The annual water rates shall begin on the first day of May in each year. Meter rates shall be due and payable at the office of the water department on the first days of May, August, November and February in each year. All special rates shall be due and payable in advance, at the office of the water department. Premises subject to meter rates after May 1, 1889, shall pay for the use of water until the meter is applied at the rate determined by the meter for the first quarterly reading after its application.

By-laws, a part of contract with consumers.

2. All ordinances of the Common Council relating to the water department and rules and regulations for the supply of water, by them approved, shall be considered a part of the contract with any person who takes water from the city works, and every such person taking the water shall be considered as having expressed his consent to be bound thereby. In the case of the violation of any of the rules, the superintendent may, with the consent of the president of the board, in writing, shut off the supply without notice, and the water shall not be turned on again until the rules are complied with and all unpaid charges and rents are paid, together with the additional charge of $1 for turning on and off the water.

Commissioners repair main pipes, reserve control of stop-cocks, etc.

3. The commissioners will repair the main pipes in the streets, and the valves and fire-plugs connected therewith or attached thereto, within a reasonable time after learning or being notified of any defect or break therein. They reserve to themselves the control of all taps on mains; they also reserve the right, whenever they or the superintendent deem it proper, or whenever there is a violation of the rules and regulations of the department, to take charge of and control the stop-cocks on laterals. They will not be accountable for any break or obstruction caused by frost or otherwise, or for damage arising by leakage from laterals, fixtures and pipes owned by individuals.

Persons introducing water to have option as to doing the work.

4 All persons desiring a water supply from the water works shall have the option of having the work (other than the tapping of the main) performed by the city or a plumber, and must first make application upon the regular form at the office of the water department, stating fully the several and various uses for which the water is desired, and in case the work is not to be performed by the city, the name of the plumber selected by said owner to do the work. Such application must be signed by the owner of the premises or his duly authorized agent or attorney, whereupon a permit for the said work will be issued by the superintendent to the said named plumber, specifying the peculiar uses applied for.

Notice to be given in case of addition or discontinuance of fixtures.

5. In case the owner shall hereafter desire any additional service-pipe or the addition or discontinuance of any fixture for which a regular rate is charged, he shall notify the department of such change within ten days.

Permit to open streets.

6. Any permit issued by the superintendent under the ordinances of the Common Council for the opening of any street for the introduction or repair of pipes, valves or fixtures, shall not be construed as granting permission to lay a lateral sewer in trench thus opened, but in all

cases a separate permit must be obtained for that purpose from the proper authority. Any violation of this rule shall subject the owner to a penalty of $5 and the shutting off of the water, which shall not be turned on again until such fine is paid.

All expense of introduction of water paid for by owner.

7. All of the expense attending the introduction of the water from the main into any premises, as well as the cost of setting the meters, must be paid by the applicant. He must keep the lateral pipes and fixtures in good repair and protected from frost at his own risk and expense, and prevent all unnecessary waste of water. In case any such charge for work done or materials furnished shall remain unpaid for one month after the presentation of the bill, the superintendent may shut off the water and not turn it on again until all charges are paid, and in addition a penalty of $2.

Bills unpaid for one month water will be shut off.

Charges outstanding on Aug. 1st of each year placed in the tax for the year.

8. All accounts or charges outstanding on the first day of August in each year, for the use of water or for the introduction and measurement of the supply, shall be assessed against the building, lot or part of a lot where the water was consumed or the material furnished, or the labor performed, and such charge shall be included in the tax for the year.

Plumber not the agent of the Water Department.

9. The plumber named in the application by the owner of the premises will be considered as the agent of said owner while on the work named in his application, and will not be recognized in any sense as the agent of the Water Department of the city of Troy, N. Y.; neither will the Board of Water Commissioners of said city hold itself responsible for acts of said plumber.

Size of taps, how determined.

10. The Superintendent of the Water Department or the Board of Water Commissioners will determine the size of the tap to be inserted in any water main under any application, up to and including one inch in

diameter. All applications for taps of greater diameter must be presented to the Board of Water Commissioners for its approval.

Tap, stop and box furnished by Department. Tapping only done by city.

11. The Water Department will furnish the tap, stop and box to be used in the introduction of the water, to be paid for on delivery. The tapping of the mains shall only be performed by employes of the Water Department, and the cost of said work shall be included in the price for the tap, stop and box. Any violation of this rule will subject the owner to a penalty of $25 and the permanent cutting off of his supply.

All cast and wrought iron work in street done by Department.

12. The work of cutting in tees or branches, the laying and repair of all cast or wrought iron pipe connecting with the same and extending from the main through or across the street and into the building, shall be performed by the Water Department at the expense of the owner or applicant.

Laterals must be at right angles to main.

13. Owners desiring to introduce a water service into their premises from the main passage in front thereof must extend such lateral at right angles to and from the main to the inside of the curb line of the street, at which point the stop and stop-cock box must be placed. The cover of the stop-cock box shall be placed at the grade of the sidewalk.

Laterals, in case where no main now laid.

14. Owners desiring the introduction of a water service into their premises along the front of which mains have not been laid, shall perform such work in compliance with the special directions therefor given, when the permit is issued.

Buildings supplied with separate laterals.

15. Permission will not be granted to supply two or more buildings fronting on the same street from a single tap unless the service shall be divided at the curb and a separate service extended therefrom controlled by a separate stop-cock for each service. The Water Commis-

sioners, however, urgently advise a separate service to each house, tenement or other building, so as to avoid future complications arising from the sale or division of the property.

Bonds to be filed to open streets.

16. No person shall be allowed to open any trench in the streets or alleys of the city of Troy for the purpose of laying any service, making any alteration, attachment or repair to the lateral pipe or fixture before filing a bond in the office of the water department and receiving a permit for the same.

Laterals laid five feet below service, 12 inches slack, stop-cock, etc.

17. The owner receiving a permit for such work shall be required to cause such service-pipe to be laid at least five feet below the surface of the ground. Every service-pipe must be laid with not less than twelve inches slack and in such a manner as to prevent rupture by settlement. There shall be stop and waste placed in every service below the action of the frost just inside of the building, so situated and arranged that the water may be drawn off from the pipes in the building when they are liable to freeze.

Sewer, gas pipes, etc., must not be in same trench.

18. No public sewer, gas, steam, electrical or other conduit shall be laid in the same trench with a water main, or within a distance of three feet of any water main now laid, without permission of the Board of Water Commissioners. Any person or corporation violating this rule shall be subject to a penalty of $10 for each offense upon conviction thereof by and before any police magistrate of the city of Troy.

Private sewer in same trench with lateral in solid ground.

19. No water lateral pipe shall be laid in the same trench with a private sewer unless it shall be laid on solid ground at the side of said sewer trench and arranged as to be easily accessible without disturbing the sewer pipe.

Trenches protected.

20. Whenever any street or public ground shall be opened for making any connection with the mains or

laying, altering or repairing any water pipe or fixture, under a permit issued by the Water Department, public safety and convenience shall be duly regarded by the erection of barricades, the suspension of red lights and all other precautions as may be required by the Water Department or any city ordinance, under a penalty of $10 for each violation and the shutting off of the supply of water.

AA lead pipe required.

21. The lead pipe used in the introduction of water into the premises shall be that known as AA, and all work and fixtures in the street shall be subject to the approval of the Water Department.

Boilers must be provided with valves. Department not responsible for damage.

22. In all cases when boilers are supplied with water, a suitable valve or other sufficient device must be applied to prevent damage from collapse or explosion when the water is shut off from the street mains. The Water Department of the city of Troy will not be liable for any damages which may result to any person or premises from the shutting off of the water from any water main or service for any purpose whatever, even in cases where no notice is given, and no deduction from the water bills will be made in consequence.

Stand pipes and automatic sprinklers, how erected.

23. Stand pipes, or pipes for automatic suppression of fires in buildings. which fixtures are only intended to be used in case of fire, will be permitted, and no charge for the use of water for that purpose will be made, but all such pipes must be provided with a valve outside the building, under the exclusive control of the Water Department; also in case of stand pipes a valve must be placed at the bottom of the stand pipe and at each hose opening, which valves shall be sealed by the Water Department. In case such seals shall be broken for the extinguishment of fires, the party breaking the seal shall immediately thereafter give notice at the office of the Water Department that the valve may be re-

sealed. In case of violation of this rule, the owner shall be liable to a penalty of $5 for each offense. In case such seal shall be broken for any other purpose or use, or any tap be introduced into or connection made with said stand pipe, the owner shall be subject to a fine of $50 and the supply permanently shut off.

Light power permits granted by Water Commissioners.

24. Permits will be granted in certain cases on special application to the Board of Water Commissioners, for supplying water from the mains for light power for elevators and other purposes. All services supplying motors shall have a water meter or other appliance which shall correctly and automatically measure and record the quantity of water which passes through said service.

Sprinkling conditions.

25. Permits for sprinkling will only be granted upon payment at the schedule rates in advance, under the following conditions: The hose used not to be larger than one inch internal diameter, and the nozzle not exceeding one-quarter of an inch in diameter. Sprinkling will only be allowed for one hour each day, and on the area covered by the permit.

Penalty for violation.

No person will be allowed to sprinkle adjoining or opposite premises. Violation of any of the foregoing provisions of this section will subject the owner to a penalty of $2 for each offense.

The right of inspection by Superintendent or those designated by him.

26. The Superintendent, or those designated by him or by the Water Commissioners, shall have the right to enter the premises of any water-taker, at all reasonable times, to examine the pipes and fixtures, to determine the quantity of water used and the manner of its use, and in case of a fraudulent representation on the part of any water-taker, or unnecessary waste of water, the payment will be forfeited and the supply shut off.

Laterals, pipes and fixtures to be kept in order by owner.

27. All damages caused by the neglect of the owners or occupants of buildings to keep their laterals, pipes, fixtures and apparatus in good order and protected from

frost, must be paid by them, and all water takers shall be liable for all such repairs as shall be deemed necessary to prevent the waste of water.

Use of water in city buildings.

28. The use of water in all city buildings shall be subject to the same requirements and inspections as in private buildings; and the Water Department shall have the right to examine all pipes, fixtures and apparatus in the city buildings, for the purpose of determining the manner and amount of its use and the prevention of unnecessary waste of water. When such waste shall be found to exist, caused by leaky or defective pipes, fixtures or apparatus, a notice of such defect shall be served upon the department having control of the building, and such department shall immediately cause the same to be repaired at its expense.

The right to shut off in case of drouth reserved.

29. The Commissioners reserve the right, in case of severe drouth or in case of the supply of water being short, of shutting off the water from all places when in the judgment of the Commissioners the supply for the time being can be suspended by refunding to the owner or occupant what money may have been paid in proportion to the time the water may have been shut off.

Yard hydrants not allowed in front of buildings.

30 No private yard hydrant will be allowed in the street, in front of any building or in the area of any building, except temporarily for the use of masons in erecting buildings, or for any other needful special purpose. No hydrant shall be left running when not in use, and if the drip or waste from such hydrant becomes a nuisance to the adjoining property or overruns the sidewalk and by freezing becomes dangerous in winter, the supply will be shut off and kept off until the trouble is corrected.

When water is turned off, $1 for turning on again.

31. In all cases where the water has been shut off for the non-payment of rents or for the violation of these rules, by the Superintendent, it shall not be turned on

again until the charge of $1 is paid for the expense, together with such fine as may be fixed for the violation of the rule. If it is found that the water has been turned on without compliance with the above requirements it shall be lawful for the superintendent to cause the tap to be withdrawn; and it shall not be inserted again until all back rents and charges are paid up and $5 additional for drawing and replacing tap. Persons feeling aggrieved by the shutting off of the water may appeal to the Commissioners, who will determine the matter.

The Water Commissioners may attach a meter to any service.

32. The Board of Water Commissioners reserve the right to attach a water meter to any service-pipe at any time whenever it shall deem it expedient so to do, and thereafter charge for the quantity of water thus metered instead of by the yearly schedule rates. After the meter is attached, any person who shall tamper with or maliciously injure the same shall, upon conviction thereof by and before any police magistrate of the city of Troy, be liable for all damages and be punished by a fine of not less than $5 nor more than $50, in the discretion of such magistrate.

Owners may apply for a meter.

33. Owners of the premises may make application to the water department to set a meter at their expense and thereafter pay for the water used at meter rates, provided that the regular assessed rates for the use of water for one year shall not be less than $20. The owner will be required to maintain said meter in perfect order and repair at his own expense.

Penalty of $10 for removing meter.

34. All persons are hereby forbidden to interfere with or remove a water meter from any service after it has been attached by order or permit of the water department, under a penalty of $10.

Whole supply to premises metered.

35. When a meter is set by order of the department or on the application of the owner of the premises, the whole supply furnished to the premises shall be metered.

If meter fails to record, the last quarter's reading shall determine charge.

36. If, from any cause, the meter breaks or the indicators fail to record, or record incorrectly, the amount of water consumed for any quarter, the owner must pay for such quarter for the same amount of water used in the last preceding quarter, unless the parties can show, to the satisfaction of the water department, that the consumption was less.

Meter, how set.

37. Between each meter and the water main, and within the building, a suitable stop-cock must be placed in the service-pipe; a plain piece of pipe of requisite size and length, to take the place of meter in the service-pipe when the meter is removed, shall be provided and kept at all times close to the meter.

Plumbing work, how done.

38. All plumbing work required outside the building must be completed and notice served upon the Water Department that the same is ready for inspection before connection is made with the lateral. The lateral shall be laid complete to the stop-cock or wall of the building before making the connection with the main; and the whole must be examined by the department before it is covered up. If from any cause the plumber fails to have the tap inserted at the time specified in his application, then notice must be left at the office fixing another day or hour on which he wishes the tap inserted. The tapper of the Water Department will fill the order of the plumber as near at the hour named by him as is possible, but the Water Department will not be responsible for any delay in filling said order or damages which may result therefrom. In case the tapper shall respond to an application of a plumber for tapping, at or later than the hour named in the notice and said tapper shall be delayed on account of the trench not being prepared, or it shall be necessary for the tapper to make another trip to do the work, the plumber will be required to pay $1, unless such delay shall be caused by unavoidable accident in the performance of the work

Notice to tap.

If trench is not ready and a second trip is necessary by tapping a charge of $1 will be made.

The notice for a tap must be given at least twenty-four hours in advance of the hour named for the work. No tap will be inserted except by special permission after 4 o'clock P. M. No opening of the street for tapping the main will be permitted (except in special cases) when the pavements are frozen. The main must be tapped at least three feet within the line of the building or lot to be supplied.

Streets not opened when pavements are frozen.

39. When a permit for a tap is issued for building purposes, the lateral shall be carried to the inside of the curb and a yard or wash hydrant set. When the building is complete the service must be taken up, tap withdrawn and the main plugged, unless it is required to be extended to supply the building, in which case application must be made in the usual manner for extension.

Permit for building purposes.

40. Any plumber who shall refuse or neglect to ram the earth in refilling the trenches, or refuse or neglect to restore and make good the streets after settlement, for a period of six months after said trench has been refilled, within twenty-four hours after notice being given to do the work, the Water Department will cause the necessary repair to be made and the cost thereof charged to the plumber. After such notice being given, no permit shall be granted to such plumber until the cause of such complaint is removed and all charges for such work paid.

Plumber refusing to restore streets will have cost of same charged to him.

41. The same rules and regulations herein mentioned relate to and govern the work of plumbers, and any plumber who shall be guilty of a violation of any of the rules and regulations of the Water Department will not be allowed to connect his work with the City Water Works until all rules are complied with, and a fine of $5 is paid for each violation thereof.

Same rules govern plumbers.

42. All plumbers shall make full returns upon blanks furnished by the Water Department of the ordinary and

Plumbers' returns.

special uses to which water is designed to be supplied under any permit granted by the Water Department, with a description of all apparatus and arrangements for using the water in every case. This return is to be made by the plumber within three days after the completion of the work and filed in the office of the Water Department. The plumbers' return shall also contain a correct measurement of the distance north, south, east or west of the service-pipe from the nearest corner of the building or lot, the measurements to be made on the house line or building line of the street; said return shall also state the name of the street in which the pipe has been tapped, the number of house or lot, the distance from the main to the stop-cock and any other particulars that the case may call for.

Building purposes—form of application.

43. Persons desiring to use the city water for building purposes will be required to make application therefor at the office of the Water Department. Said application shall state in detail the use for which water is desired, the name of the owner of the property and the number of the lot or house on which the water is to be used, as follows:

1. Name of owner of premises.
2. Name of builder.
3. Number of house or lot at which water is used.
4. Name of street.
5. Number of brick to be laid.
6. Number of cubic feet of stone to be laid.
7. Number of square yards of plastering.

Estimated amount of water paid in advance

44. The amount of the charges for water at schedule rates for work, thus stated, shall be paid in advance to the Water Department before a permit for such use shall be issued to the applicant.

45. The applicant, on completion of his work thus applied for, shall make a return, under oath, to the Clerk of the Board, of the amount of each kind of work actually done by him. In case it shall appear that more work was done than was first applied for, the applicant will be required to pay for such excess. Return under oath of amount actually used.

46. In case it shall appear that the person receiving such permit has made fraudulent representations or returns as to the amount of work done under said permit, no further permit will be issued to said applicant, or to any person for him, or in his behalf, under any circumstances. In case of fraudulent representation, no further permit issued.

47. The builder must in all cases procure a permit as before provided, previous to procuring water for building purposes from any city water fixture. Permit must be obtained before use.

48. In case the builder desires to use water from a service supplying water to adjacent premises, he must file in the Water Department office the written consent of the owner of said adjacent service at the time of making the application for the use of said water. Permission to use water from private lateral must be filed.

49. All by-laws and regulations, or parts thereof, in relation to the water works, heretofore approved by the Common Council, in conflict with any of the provisions of the above by-laws and regulations, are hereby annulled. All former by-laws, &c., rescinded.

ANNUAL WATER RATES.

The following rates were, upon the recommendation of the Water Commissioners of the city of Troy, approved and adopted by the Common Council, March 21 and October 29, 1889, and are now in force:

BUILDING RATES.

For each building having a frontage of twenty-five feet or less, used for dwelling, store, shop, business or manufacturing purposes, upon streets or alleys where mains are laid..	$5 00
For each house arranged in the style known as apartments or flats, twenty-five feet frontage or under, per three flats or suits of apartments	10 00
For each additional apartment or flat.....	2 00
For each tenement house in rear having a frontage of twenty-five feet or less, on streets or alleys where no mains are laid, not more than two families.....	3 00
For each additional family.....	1 00
For each foot of building on rear of lot not used for dwelling, store, shop, business or manufacturing purposes.....	05
For each foot of vacant lots on streets where mains are laid.....	02
For each building fronting on two or more streets, where mains are laid, used for other than dwelling purposes, the rate shall be fixed by the frontage on the longer side.	
For each additional foot of frontage above twenty-five feet on all buildings, front or rear, an increased rate of four per cent.	

The building rate above established for dwelling houses, flats and tenements, entitles the owner to a necessary use of water for domestic purposes. All other buildings must pay in addition to the building rate, for the water actually used in the building according to the rates established for the use of water, or at the regular meter rates.

RATES FOR THE USE OF WATER.

For each building used as a dwelling and store combined, in addition to the building rate, from.....$1 00 to $10 00

For each store, shop or saloon, wholesale or retail, in addition to the building rate, from.....$1 00 to 10 00

For each building used as a boarding house, in addition to the building rate, from....$5 00 to 25 00

For offices and lodging rooms in buildings not used as dwellings, each..... 1 00

For each bath tub in dwelling..... 2 00

For each water closet in dwelling..... 3 00

For each urinal in dwelling 2 00

For each bath tub, water closet or urinal in shops, saloons, tenements, office and manufacturing buildings, or where large numbers may and do have access to the same, double the above rates.

For bakeries, per barrel of flour, or less, used daily..... 00

For banks and banking houses, from.....$2 00 to 5 00

For barber shops, per chair 2 00

For bookbinderies, from.....$2 00 to 5 00

For cows, each..... $1 00

For hydraulic compressors in saloons..... 5 00

For fountains, $\frac{1}{16}$ to $\frac{1}{4}$ inch jet, per season, from.....$15 00 to 50 00

For foundries, per moulding floor..... 60

For horses—private stables—

For each team or horse used for pleasure driving..... 5 00

For each additional horse..... 2 00

For work horses—

For each team or single horse..... 2 00

For each additional horse..... 1 00

For markets, from.....$2 00 to 6 00

For photographic establishments, from $10 00 to 25 00

For printing establishments, from.....$5 00 to 15 00

For public halls, from.....$5 00 to 20 00

For soda fountains, from.....$3 00 to 10 00

Additional for tumbler washer..... 3 00

For steam engines, per horse power..... 2 50

For stand pipes in buildings, to which hose is or may be attached, or for automatic sprinklers put in and used for fire purposes only, NO CHARGE.

Said stand pipes to be put in under the direction of the Superintendent, who may examine all such fixtures, and if found defective may withhold the supply of water until the work is satisfactory to him. In no case will any stand pipe or pipe supplying automatic sprinklers be allowed to be tapped or have any connection for the delivery of water for any other purpose.

For theatres, from.....$5 00 to 25 00

For other uses not herein enumerated, Meter rate as follows :

METER RATE.

For each one thousand gallons used for all purposes..... 5 cents.

Water-takers paying for their supply by meter measure shall be entitled to a rebate on their water bills equal to the amount of the building rate assessed in the tax books on the premises where the water is used.

Meters to be taken monthly; bills to be rendered and paid quarterly.

Whenever this department has reason to believe that any consumer is using more than the amount set opposite the taxed rate, or the consumer is dissatisfied with the taxed rate, he may make application for the measurement of the supply, and the superintendent shall, at the direction of the Board of Water Commissioners, place a meter upon the supply-pipe for the purpose of measuring the water actually consumed. Such meter will be furnished by the city and set at the expense of the owner. In case the quantity, as determined by meter, is more than allowed by the rate, the owner will be charged for such additional quantity at the meter rate, from the date of the application of the meter, and in case the quantity as determined by the meter is less than allowed by the rate, the city will refund such difference, at the meter rate, from the date of the application of the meter to the end of the year for which such rate was fixed. In no case, however, will the application for a meter be granted when the annual rate is less than $20.

SPECIAL RATES—Payable in advance.

Sprinkling with small hose sidewalks and roadway, washing stoops, windows and fronts, for each twenty-five feet of frontage, not to exceed one hour a day, with nozzle not larger than ¼ inch	$3 00
For each additional lineal foot of street sprinkled, as above	10
Sprinkling, with small hose, grounds and lawns, for each 100 square feet sprinkled, not exceeding one hour per day, with nozzle not larger than ¼ inch	40
Sprinkling grounds and lawns with revolving sprinkler, for each 100 square feet sprinkled,	80
For filling cisterns, flushing vaults or sewers with hose from fire hydrant, including use of man for first hour or fraction thereof	2 00
For each succeeding hour or fraction thereof	1 00
For all watering troughs, which must be fitted up with float valve purchased of the department, under the direction of the superintendent for the season of eight months	5 00
Brick, per thousand	07
Stone-work, per hundred cubic feet	06
Plastering, per hundred square yards	30
Sewing machines, used as a means of livelihood, per year, payable monthly	12 00

REPORT OF

EDWARD DOLAN,

SUPERINTENDENT,

TROY WATER WORKS.

Board of Water Commissioners:

GENTLEMEN—The following report of the operation and condition of this Department, for the year ended February 28th, 1893, is presented:

SUPPLY.

The combined supply from the gravity and pumping systems failed to afford a sufficient quantity of water to adequately maintain the three services during the year. In March all the reservoirs were filled by the melting snow and ice, and for six days in that month there was water enough for the entire city without the aid of the pumps, but the demand thenceforth was so great that the pumps have been run continuously all the time, night and day, except for two days recently in February and when obliged to stop occasionally for necessary repairs. The rain-fall for the summer months, although above the average, was not sufficient to increase the supply on the gravity system, and the almost total failure of the fall rains left the storage reservoirs in a dangerously low state. On the 23d of September a caution notice to consumers to exercise care in the use of water was published, but with no appreciable result. The shrinking of the supply continually in-

creasing and the weather being extremely cold, on the 30th of December I called the attention of the Board to the alarming condition of matters and Eighth street and all the territory west of the same was cut off from the middle and placed on the low service, and the use of water for motors on the upper and middle services was prohibited. At this time there was not water enough on hand to furnish the upper and middle services until the middle of January. An opportune rain on the first day of the new year, however, gave some relief in that quarter and prevented the total depletion of the upper reservoirs. At the same time the draft on the low service was so excessive, occasioned by the practice of allowing the water to run to waste to prevent the freezing of pipes, that the pumps were unable to meet the demand and each day the lower Oakwood reservoir showed a diminishing supply. The most rigid house to house inspection was instituted and when water was found being wasted the supply was shut off. On the 13th of January, Brunswick lake being down 13 feet 9 inches, Vanderheyden 14 feet 7 inches, Upper Oakwood 6 feet 6 inches, and Lower Oakwood 12 feet, and with no indication of a thaw, it seemed as if all our water would soon be gone. It was then deemed advisable by the Commissioners in order to secure water in case of a severe fire to connect the 12-inch main in Congress street, near Cypress street, with a similar sized pipe running from the flume of the curry-comb factory on the Marshall estate and turn in the waters of the Poestenkill if it should become necessary. Permission having been obtained from the Trustees of the Marshall estate the connection was immediately made, controlled by suitable valves, and can be used in case of an emergency. The head from which this pipe starts is somewhat higher than the low service distributing reservoir and would be quite effective in the main

part of the city. On the 24th of January, Brunswick lake being 16 feet 6 inches, Vanderheyden 16 feet 5 inches, Upper Oakwood 5 feet 2 inches, and Lower Oakwood 17 feet 3 inches below the flow line, the somewhat hazardous expedient was resorted to of shutting off the principal 24-inch main at the low service distributing reservoir, which supplies the major part of the city, at 6 o'clock in the evening and opening it at 6 o'clock in the morning, thereby reducing the pressure about two-thirds during the night. A connection was made with the fire alarm system and a gong was placed in the well house. A competent man was put in charge to let on the water in case of an alarm of fire from the district affected by the reduced pressure. The plan adopted was eminently successful. A large quantity of water —at least one million gallons—was nightly saved thereby and no bad results followed the repeated shutting on by admitting air into the distribution. Only one fire occurred while this course was pursued, and on that occasion the water was promptly turned on by the man in charge and the steamers were abundantly supplied. After the 10th of February the increase in the reservoirs warranted the restoration of the full pressure.

Under the head of pumping service will be found a complete statement of the work of the pumps during the past year, which shows that they were driven to their utmost capacity and delivered 2,210,887,684 gallons as against 2,006,391,944 the year previous, an increase of 204,495,740 gallons, and they were in operation 350 days, or twenty-five days more than in 1891 and fifteen days more than in any previous year.

RESERVOIRS.

The reservoirs under this department comprise: The distribution reservoir west of Oakwood avenue, elevation 202 feet above tide, capacity 4,000,000; the Lower Oak-

wood, just east of Oakwood avenue, elevation 242 feet above tide, capacity 45,000,000. These two are the source of the low service and supplied by the pumping works at Lansingburgh. The Upper Oakwood or middle service, elevation 290 feet above tide, capacity 60,000,000; the high service west of Brunswick road, elevation 382 feet above tide, capacity 5,000,000; and beyond, the storage reservoirs, Vanderheyden, capacity 180,000,000, and Brunswick, capacity 350,000,000.

The work done at the reservoirs and buildings this year was as follows:

Care of reservoir grounds, consisting of cutting grass, removing of eel grass, and weeding along the borders of the reservoirs, and keeping roads and fences in repair; labor and material. Cost	$708 00
Cleaning high service reservoir, completed Sept. 5; labor. Cost	219 00
Cleaning both branches of Piscawenkill, from Vanderheyden Lake to lands of John Duke. Cost	64 50
Paving and setting curb and flags on sidewalks at Ferry street and State street yards, labor and material. Cost	90 08
Repairing brick work of Oakwood well house, labor and material. Cost	381 82

DISTRIBUTION.

There was laid 5,033 feet of pipe in distribution, of which 753 feet was laid to replace 456 feet of 4-inch and 297 feet of 3-inch pipe taken up in Harrison place. The various sized pipe are divided in the services as follows:

Low service	4,709 feet.
Middle service	
High service	69 "
Including fire hydrant laterals in the various services.	255 "

The pipeage of the services is as follows per table:

Service.	DIAMETER IN INCHES.									Hydrants.
	24	20	16	12	10	8	6	4	Less than 4	
Low ..	7,132	14,568	4,283	18,490	4,429	27,317	64,203	15,313	2,920	471
Middle	.....	7,796	2,794	6,158	.....	14,502	21,423	1,121	280	113
High ..	.....	11,593	4,240	12,003	.....	13,449	20,832	98	.....	133
Fire hyd'nt later'ls	.....	.....	.....	.....	.....	.....	.....	12,772	.....	...
Totals.	7,132	33,957	11,317	36,651	4,429	55,268	106,458	29,304	3,200	717

Low service	30.251	miles.
Middle service	10.1454	"
High service	11.4135	"
Fire hydrant laterals	2.2212	"
Force mains	3. 913	"
	$57\frac{3}{6}\frac{6}{2}\frac{8}{8}\frac{5}{0}$	" .

The streets in which mains have been laid this year are:

Third and Broadway, placing fire hydrant and valve, 18 feet 4-inch pipe, 1 10-inch valve, 1 4-inch valve, with necessary specials. Cost..... $113 65

Ingalls avenue and North Fourth street, placing valve on main, 1 6-inch valve, with necessary specials. Cost..... 29 69

Van Buren street, extending 4-inch line from Fourth street eastwardly 27 feet 4-inch, with necessary specials. Cost..... 52 66

Fifth avenue and Liberty street, placing fire hydrant northwest corner, with necessary specials. Cost.. 31 10

Monroe street, extending 8-inch line from a point 150 feet west of west line of River street westwardly, 157 feet 8-inch pipe, 19 feet 4-inch pipe, with necessary specials. Cost..... 217 03

Berger Lane blow-off, extending 8-inch line westwardly, 48 feet 8-inch pipe, with necessary specials. Cost, 32 67

Alley west of River street on the south line of Laureate avenue, placing valve on main 1 6-inch valve, with necessary specials. Cost..... 24 25

River and Hutton streets, placing new valve on main, 1 12-inch valve, 4 feet 12-inch pipe, with necessary specials Cost $70 27

Douw street, extending 6-inch line from North Fourth street to Sixth avenue, 247 feet 6-inch pipe, with necessary specials. Cost..... 207 76

North Fourth street, extending 24-inch line from a point 213 feet north of north line of Middleburgh street to Park avenue, 1,658 feet 24-inch pipe, 64 feet 4-inch pipe, with necessary specials. Cost.... 6,593 85

Reconnecting 29 laterals. Cost..... 59 30

Front street, laying 6-inch line from main in Ferry street north, 143 feet 6-inch pipe, with necessary specials. Cost..... 154 66

Washington and First streets, placing new valve on main, 1 8-inch valve, with necessary specials. Cost 40 87

Washington and First streets, placing new fire hydrant on southeast corner, 10 feet 4-inch pipe, with necessary specials. Cost..... 46 07

Washington street at alley bet. First and Second, placing new fire hydrant on northeast corner, 10 feet 4-inch pipe, with necessary specials. Cost..... 45 91

Second and Tyler, placing new valve on main, 1 6-inch valve, with necessary specials. Cost 31 69

Tyler and Second, placing new valve on main, 1 8-inch valve, with necessary specials. Cost..... 42 22

Tyler street, extending main from First to Second, 140 feet 8-inch pipe, 11 feet 4-inch pipe, with necessary specials. Cost..... 238 58

Tyler street, extending main from a point 590 feet east of east line of Fourth street eastwardly, 288 feet 6-inch pipe, 8 feet 4-inch pipe, with necessary specials. Cost..... 275 47

Van Buren street, placing new fire hydrant at northeast corner of alley bet. First and Second streets, 8 feet 4-inch pipe, with necessary specials. Cost..... 38 44

Van Buren street, extending main from First street westwardly, 252 feet 6-inch pipe, 12 feet 4-inch pipe, with necessary specials. Cost..... 253 83

Kelly street, extending main from Burden avenue to Cross street, 230 feet 6-inch pipe, 14 feet 4-inch pipe, with necessary specials. Cost	$249 90
Cross street, extending main from a point 277 feet south of Stowe street southwardly, 425 feet 6-inch pipe, 22 feet 4-inch pipe, with necessary specials. Cost,	408 06
Harrison Place, laying 6-inch line, formerly 3-inch and 4-inch, from Federal street to Jacob street, 753 feet 6-inch pipe, 21 feet 4-inch pipe, with necessary specials. Cost	681 87
Reconnecting 28 laterals; cost	66 60
Jefferson street, extending main from Second to First street, 345 feet 6-inch pipe, 32 feet 4-inch pipe, with necessary specials. Cost	394 04
Congress and First streets, placing new valve on main, 1 10-inch valve, with necessary specials. Cost	53 98
Congress street, east of Marshall street, connecting 12-inch line from Poestenkill with 12-inch line in Congress street, 65 feet 12-inch pipe, with necessary specials. Cost	381 89

PLACING VALVES ON FIRE HYDRANT LATERALS, OLD WORK, AS FOLLOWS:

Fourth and Madison; labor and material. Cost	$22 02
Fourth street at No. 404; labor and material. Cost	22 02
Fourth street, opposite Hanover; labor and material. Cost	27 35
Fourth and Harrison; labor and material. Cost	20 80
Congress and Second; labor and material. Cost	21 40

MAINS LAID IN 1892.

STREETS.			SIZE OF PIPE.					Valves.	Hydrants	Service.	COST PER FOOT IN CTS.					Total per foot.	Total cost.
IN	FROM	TO	24in	12in	8 in	6 in	4 in				Pipes and Spec'ls	Valves and Hyd'ts.	Labor.	Lead and Coke.	Incidentals		
Third	Broadway	Hydrant & valve.	....	....	....	....	18	2	1	L	90.5	432.8	73.3	29.2	5.5	631.3	113.65
Ingalls avenue	North Fourth	Valve	....	....	....	....	....	1	....	L	....	....	....	....	....	....	29.69
Fourth	Madison	Valve	....	....	....	....	3	1	....	L	54.	541.	90.	49.	....	734.	22.02
Fourth	No. 404	Valve	....	....	....	....	3	1	....	L	54.	541.	90.	49.	....	734.	22.02
Van Buren	Fourth	East	....	....	....	....	27	1	....	L	23.1	60.1	105.5	6.3	....	195.	52.66
Fourth	Opposite Hanover		....	....	....	....	....	1	....	L	....	....	....	....	....	....	27.35
Fifth avenue	Liberty	Hydrant	....	....	....	....	....	....	1	L	....	....	....	....	....	....	31.10
Monroe	....	....	....	....	157	....	19	....	1	L	59.2	15.1	37.1	9.9	2.	123.3	217.03
Berger lane	....	Blow-off	....	....	48	....	....	....	....	H	54.	....	7.8	6.2	....	68.	32.67
Alley west River	South of Laureate	Valve	....	....	....	....	..	1	....	L	....	....	....	....	....	....	24.25
River	Hutton	Valve	....	4	....	....	....	1	....	L	210.5	1131.3	337.5	52.5	25.	1756.8	70.27
Douw	North Fourth	Sixth avenue	....	....	....	247	....	2	....	L	38.	17.2	21.11	4.6	3.2	84.11	207.76
North Fourth	....	Park avenue	1658	....	....	....	64	7	3	L	262.4	23.	69.	16.9	11.6	382.9	6593.85
Ferry	West	....	}	....	....	143	....	1	....	L	45.3	14.8	37.	9.6	1.4	108.1	154.66
Front	Ferry	North	}														
Washington	First	Hydrant	....	....	....	....	10	....	1	L	80.	264.	90.	26.5	....	460.5	46.05
Washington	First	Valve	....	....	....	....	....	1	....	L	....	....	....	....	....	....	40.87
Washington	Bet. 1 & 2 at alley.	Hydrant	....	....	....	....	10	....	1	L	78.6	264.	90.	26.5	....	459.1	45.91
Fourth	Harrison	Valve	....	....	....	....	....	1	....	L	....	....	....	....	....	....	20.80
Second	Tyler	Valve	....	....	....	....	....	1	....	L	....	....	....	....	....	....	31.69
Tyler	Second	Valve	....	....	....	....	....	1	....	L	....	....	....	....	....	....	42.22
Tyler	First	Second	....	....	140	....	11	1	1	L	63.	36.2	46.1	10.6	2.1	158.	238 58
Tyler	Hudson	Hickory	....	....	....	288	8	1	1	L	38.6	16.2	31.2	5.6	1.5	93.1	275.47
Van Buren	Bet. 1st and 2d	Hydrant	....	....	....	....	8	....	1	L	23.	330.	112.5	15.	.. .	480.5	38.44
Van Buren	First	West	....	....	....	252	12	1	1	L	39.7	18.	31.6	5.5	1.4	96.2	253.83
Kelly	Burden avenue	Cross	....	....	....	230	14	2	1	L	40.2	28.2	28.7	3.8	1.5	102.4	249.90
Cross	....	Kelly	....	....	....	425	22	1	2	L	40.9	16.6	27.4	5.	1.4	91.3	408.06
Harrison place	Federal	Jacob	....	....	....	753	21	2	2	L	40.1	12.3	28.3	6.1	1.3	88.1	681.87
Jefferson	Second	First	....	....	....	345	32	2	2	L	40.7	25.3	31.31	5.8	1.4	104.51	394.04
Congress	First	Valve	....	....	....	....	....	1	....	L	....	....	....	....	.. .	....	53.98
Congress	Second	Valve	....	....	....	....	....	1	....	L	....	....	....	....	....	....	21.40
Congress	Marshall	....	....	65	....	....	..	2	....	H	146.6	131.5	184.	43.3	82.1	587.5	381.89

RAISING MAINS IN THE FOLLOWING STREETS:

Middleburgh and Ninth streets, 9 feet 6-inch pipe, 4 6-inch bends, 1 6-inch sleeve, 80 lbs. lead, 1 bushel coke, 2 lbs. yarn, 3.5 days' labor. Cost..... 25 14

RAISING FIRE HYDRANTS.

Fourth and Canal avenue, 3.1 days' labor; commenced and completed April 15. Cost..... 4 65
Fourth street at No 370, 3 days' labor; commenced and completed May 11. Cost..... 4 50
Fourth, opposite Trenton, 2.9 days' labor; commenced and completed July 7. Cost..... 4 35
Fourth and Jackson, 2.9 days' labor; commenced and completed July 8. Cost..... 4 35
Maple avenue, bet. Pawling and Spring avenues, 1 4-inch sleeve, 4 4-inch bends, 56 lbs. lead, 1 bushel coke, 2 lbs. yarn, 2.3 days' labor; commenced and completed Oct. 27. Cost..... 16 11
Brunswick avenue and Congress street, 1 4-inch offset, 6 lbs. lead, 1 lb. yarn, 1 bushel coke, 2 days' labor; commenced and completed Nov. 19. Cost..... 5 89
Congress and Pawling avenue, 4 days' labor; commenced and completed Dec. 1. Cost..... 6 00

LOWERING FIRE HYDRANTS.

Van Buren and Fourth streets, 2.7 days' labor; commenced and completed July 2. Cost..... 4 05
Fourth and Harrison, 4 days' labor; commenced and completed Aug. 4 Cost..... 6 00

There have been added to the distribution this year 35 valves—25 on street mains, 12 on fire hydrants—located as follows:

LOCATION OF STOP GATES.

Street containing Mains.	Intersecting Street.	Size.	Co-ordinates.	
Alley West River.	S. L. Laureate....	6	9.9 W. of E. L. of alley.....	on S. L. of Laureate avenue.
Congress.....	First.....	10	4. W. of W. L. of First.....	29. S. of N. L. of Congress.
"	Marshall.....	12	1. S. of S. curb on S. side of Congress street,	14.6 E. of railroad pole E. of Cypress st. [Shut.
"	"	12	40.6 S. E. of E. jamb of door of No. 2 Ida Place,	37. S. W. of W. jamb of door of No. 4 Ida Place.
Cross	Kelly.....	6	on N. L. of Kelly.....	24. W. of E. L. of Cross.
Douw.....	North Fourth.....	6	on E. L. of North Fourth.....	22.6 N. of S. L. of Douw.
"	"	6	41. S. E. of 24-inch valve.....	34.6 N. E. of valve on fire hydrant.
Front	Ferry	6	on N. L. of Ferry.....	12. W. of E. L. of Front.
Harrison Place....	Federal.....	6	1.5 N. of S. L. of Federal.....	26. W. of E. L. of Harrison Place.
"	Jacob.....	6	on S. L. of Jacob	28. W. of E. L. of " "
Ingalls avenue....	North Fourth.....	6	on W. L. of North Fourth....	22.8 S. of N. L. of Ingalls avenue.
Jefferson	First.....	6	on E. L. of First.....	24.8 N. of S. L. of Jefferson.
"	Second.....	6	on W. L. of Second.....	28.9 N. of S. L. of "
Kelly.....	Burden avenue ...	6	on W. L. of Burden avenue.....	11. S. of N. L. of Kelly.
"	Cross	6	on E. L. of Cross.....	14.6 N. of S. L. of "
North Fourth.....	Douw.....	24	1. N. of N. L. of Douw	27. E. of W. of North Fourth.
River	Hutton.....	12	2.10 S of S. L. of Hutton.....	22.10 W. of E. L. of River.
Second	Tyler	6	6 inches S. of S. L. of Tyler.....	19. W. of E. L. of Second.
Third	Broadway.....	10	30 W. of E. L. of Third.....	1. S. of S. L. of Broadway.
Tyler.....	Second.....	8	1.6 E. of E. L. of Second.....	24. N. of N. L. of Tyler.
"	"	8	on W. L. of "	24. N. of S. L. of "
"	Vine.....	6	on W. L. of Vine.....	28. S. of N. L. of "

Van Buren	First	6	on L. of First on E. L. Burk's house,	21.7 S. N. L. of Van Buren.
"	Fourth	4	on E. L. of Fourth.	22. S. of N. L. of "
(9) Washington	First	8	on E. L. of First.	25. N. of S. L. Washington.

LOCATION OF FIRE HYDRANT VALVES.

Street containing Mains.	Intersecting Streets.	Size.	Co-ordinates.	
Congress	Second	4	5.6 from fire hydrant.	1 ft. east of hydrant.
Fourth	Madison	4	4.8 " " "	
"	At No. 404	4	6.10 " " "	
"	Opp. Hanover	4	6.9 " " "	
"	Harrison	4	5.4 " " "	
North Fourth	Near Park ave	4	8.6 " " "	
"	At Gas House	4	6. " " "	
"		4	234 feet south of Gas House valve.	
"	Douw	4	10. from fire hydrant	
"	Midway in block	4	10. " " "	
"	Ingalls avenue	4	10. " " "	
Third	Broadway	4	8.6 " " "	

There have been added to the distribution this year 19 fire hydrants, location found in general report.

During the year there were 35 leaks on mains, distributed as follows:

On force mains 9, costing in labor, etc	$255 78
On distribution 21, costing in labor, etc	132 47
Fire hydrant laterals 5, costing in labor, etc	22 10

The increase in cost of leaks on force main was caused by the bursting of one length of 30-inch pipe on the force main in Eddy's lane and by having to do the repairing on the other leaks while the pumps were in operation, as we could not shut down on account of the scarcity of water.

Inspection and repairs of fire hydrants there were 1 new stand pipe and 138 thawed out. Cost	$186 65

There were 1,300 leaks reported by the inspectors, divided as follows: 75 in laterals, 292 in water closets, 491 in faucets, 389 in yard hydrants, 53 in wash hydrants.

There are now 239 meters in use, having applied this year 18. The following table shows the location and application as to use of meters:

Asylums	3
Baths	3
Bakery	1
Bottling works	8
Breweries	11
Brickyards	2
Church organs	19
Club houses	3
Coffee mills	1
Dye houses	3
Elevators	19
Fan motors	6
Foundries	4
Institutions, charitable	10
Institutions, educational	4
Institutions of correction	3
Hotels	16

Laundries	15
Liveries	18
Malt houses	5
Manufactories	49
Public buildings	5
Private building offices	3
Private houses	4
House organs	2
Railroads	11
Stores	8
Tanneries	3
Total	239

Twelve meters have been removed temporarily on account of cold weather, which are to be replaced. The following table shows the size and make of all meters in use:

		6 in.	4 in.	3 in.	2 in.	1½ in	1 in.	¾ in	Tot'l
Crown	....	1	5	5	8	15	49	47	130
Worthington	....	....	5	7	13	19	17	20	81
Union rotary	....	....	....	1	2	2	4	....	9
Hersey	....	....	....	....	....	1	1	....	2
Frost	....	....	....	....	....	....	1	....	1
Thomson	....	....	....	....	....	....	3	....	3
Elevator Counters	13	....	....	...	....	....	....	....	13
	13	1	10	13	23	37	75	67	239

The inspection and maintenance of meters cost $85.40 for this year, while none have failed. A small number have been replaced by other makes or larger size, where found not to be suitable, either in giving quantity or by too rapid moving, causing an unpleasant noise. All have been set with stop valve on the inlet side and replacing tube left with the meters to facilitate the taking out for repairs or testing.

There are 44 sewing machine motors in use in the city at this date.

The quantity of water metered this year is 357,121,000 gallons.

Engine Record for the Year Ending February 28, 1893.

TWO SETS OF HOLLY "QUADRUPLEX" ENGINES.

MONTHS.	No. of days pumping Engine No. 1.	No. of days pumping Engine No. 2.	Total days pumping.	Average pumping time.	Total revolutions per minute.	Average per minute.	COAL. Starting, banking and heating.	COAL. Pumping.	COAL. Total.	Ashes, per cent.	Gallons pumped per month, deduction 4 per cent. for loss of action.	Ave'ge No. galls. pumped per 1 lb. of coal.	Ave'g. No. galls. raised 100 ft. per 1 lb. coal.	Average head against pumps.	Duty in lbs of water raised 1 ft. high per 100 lbs. coal—circulation on total coal.
March, 1892	16½	8½	25	23.22	531,611	15.16	13,300	609,800	623,100	18.69	154,369,627	247.74	599.53	242	50,001,786
April	12⅓	16½	29	23.44	634,577	15.36	4,200	721,100	725,300	19.02	184,268,976	254.06	614.83	242	51,262,425
May	14	13	27	23.10	575,692	15.34	12,100	625,356	637,456	18.64	167,169,904	262.24	634.62	242	52,928,464
June	7½	22½	30	23.55	664,869	15.44	3,000	752,300	755,300	17.71	193,065,192	255.61	618.58	242	51,593,250
July	13⅓	17½	31	23.56	676,834	15.21	2,700	789,600	792,300	16.94	196,539,598	248.06	600.31	242	50,065,876
August	8⅓	22⅓	31	23.43	677,320	15.35	3,600	768,900	772,500	18.58	196,680,723	254.60	616.13	242	51,385,989
September	13½	15½	29	23.55	634,381	15.24	6,000	726,700	732,700	18.94	184,212,062	251.42	608.44	242	50,742,667
October	00	30	30	23.54	665,505	15.47	4,400	747,900	752,300	18.91	193,249,874	256.88	621.65	242	51,845,322
November	28½	1½	30	23.53	660,001	15.35	4,600	762,400	767,000	19.03	191,651,618	249.74	604.37	242	50,431,112
December	11	20	31	23.33	666,651	15.22	8,600	765,800	774,400	19.34	193,582,650	249.85	604.64	242	51,077,478
January, 1893	8½	22½	31	23.51	669,874	15.10	5,200	778,900	784,100	19.25	194,518,548	248.08	600.35	242	50,069,238
February	15	11	26	23.23	556,438	15.25	7,800	640,900	648,700	19.31	161,578,912	249.08	602.77	242	50,271,541
Shortage	...	...	...	....	.....	.....	.....	323,067	323,067	.....	.....	.....	.....	...	.....
Totals, 1892	149	201	350	23.43	7,613,753	15.29	75,500	9,012,723	9,088,223	18.02	2,210,887,684	243.27	588.71	242	49,098,601
Total and ave's, 1891	158	167	325	23.23	6,909,520	15.15	109,660	7,784,277	7,893,937	18.31	2,006,391,944	254.17	615.09	242	51,298,366
" " " 1890	129	104	233	21.39	4,507,358	14.88	266,791	4,911,297	5,178,088	19.74	1,306,773,232	252.3	610.50	242	50,934,520
" " " 1889	177	136	313	21.30	5,985,703	14.74	218,550	6,531,126	6,749,676	17.9	1,736,863,103	254.4	623.15	242	51,471,826
" " " 1888	101	197	298	22.28	5,997,343	14.75	182,060	6,738,207	6,930,267	18.5	1,741,186,964	252.5	611.05	242	51,082,700
" " " 1887	150	158	308	22.46	6,520,619	15.34	156,801	7,014,514	7,171,315	16.6	1,859,926,727	256.0	619.5	242	52,485,070
" " " 1886	109	202	311	22.27	6,492,460	15.47	138,689	6,759,038	7,344,717	15.5	1,889,414,858	257.2	622.4	242	51,847,919
" " " 1885	63	208	271	22.00	5,625,714	15.59	202,503	5,798,890	6,001,393	15.5	1,630,500,310	280.0	677.6	242	55,415,409
" " " 1884	175	133	308	20.58	6,095,775	15.30	233,935	6,107,853	6,341,788	19.0	1,767,004,849	272.0	658.7	242	54,952,007
" " " 1883	95	238	333	14.43	4,599,981	15.6	701,940	4,230,786	4,932,726	18.8	1,333,626,492	270.0	653.4	242	54,428,220
" " " 1882	91	161	252	13.47	3,239,261	15.5	601,878	3,014,271	3,616,149	18.6	943,562,395	260.0	629.2	242	53,036,527
" " " 1881	159	176	335	13.35	4,175,129	15.3	778.810	4,018,420	4,779,230	18.8	1,210,044,908	252.0	609.8	242	50,799,672

PUMPING SERVICE.

The following table shows in detail the operations of the machinery and boilers, the cost of the various items of coal, labor, gas, etc., and the annual expenditures.

The boilers were under steam 353 days as against 330 days the preceding year, as follows, the time of each boiler being stated separately: No. 1, 218 days; No. 2, 229 days; No. 3, 224 days; No. 4, 235 days; No. 5, 198 days; No. 6, 201 days. Until November 27th, 1891, the boilers were run three at a time, when at the suggestion of Commissioner Hall, the Board decided it was best to run four of them at once, and since that time they have been so run. The object of doing this was to save the linings of the furnaces, which were being rapidly burned out under the old system, causing considerable cost to the Board, and also for the purpose of not forcing the boilers to their extreme capacity, which had been done to the above mentioned date. I am happy to state the object has been accomplished, and the results that have been secured are all that the Board desired or expected, and the boilers and furnaces are doing good work and giving great satisfaction. The boilers are still doing the same work.

Engine No. 1 was in operation 149 days for an average of 23 hours and 33 minutes per day, raising during that time 924,828,580 gallons of water, or an average of 6,206,903 gallons for each day the engine was in operation.

Engine No. 2 was in operation 201 days for an average of 23 hours and 49 minutes per day, raising during

that time 1,286,059,104 gallons, or an average of 6,398,304 gallons for each day the engine was in operation.

Taken as a whole the pumping machinery was in operation for 350 days, during an aggregate of 8,298 hours and 4 minutes, an average of 23 hours and 43 minutes each day, and raised 2,210,887,684 gallons of water, or an average of 6,316,822 gallons per day for each day the machinery was in operation.

A comparative statement of the number of days run by each engine (since their introduction) in tabular form may be of interest to the Board and is herewith presented:

RECORD OF ENGINES NOS. 1 AND 2, DAYS WORKED EACH YEAR.

Years.....	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	Total
Engine No 1 ..	....	159	91	95	175	63	109	150	101	177	129	158	149	1556
Engine No 2..	....	176	161	238	133	208	202	158	197	136	104	167	201	2081
Total.....	....	335	252	333	308	271	302	308	298	313	233	325	350	3637

NOTE.—Calculations based upon displacement of pumps (302.48 U. S. gallons per revolution) less 4 per cent. for loss of action.

PUMPAGE—DAYS, HOURS, MINUTES AND AVERAGES.

MONTHLY PUMPAGE OF WATER.

MONTHS.	ENGINE NO. 1.				ENGINE NO. 2.				ENGINE NO. 1.	ENGINE NO. 2.
	Days.	Hours.	Minutes.	Average.	Days.	Hours.	Minutes	Average.		
March, 1892	16½	382	45	23.12	8½	201	28	23.42	100,135,205	54,234,422
April	12½	290	31	23.14	16½	398	05	24.00	77,251,165	107,017,811
May	14	317	45	22.42	13	307	48	23.40	84,582,410	82,587,494
June	7½	182	30	24.00	22½	535	10	23.47	48,951,814	144,113,378
July	13½	325	00	24.00	17½	416	45	23.48	84,889,342	111,650,256
August	8½	195	03	22.57	22½	540	20	24.00	51,364,298	145,316,425
September	13½	323	15	23.57	15½	370	10	23.53	85 072,282	99,139,780
October	00	000	00	00.00	30	717	01	23.54	00,000,000	193,249,874
November	28½	682	37	23.57	1½	34	00	22.40	182,401,828	9,249,790
December	11	254	49	23.09	20	475	22	23.46	65,518,329	128,064,321
January, 1893	8½	202	30	23.49	22½	537	00	23.52	51,538,527	142,980,021
February	15	352	00	23.28	11	256	10	23.17	93,123,380	68,455,532
Total	149	3,508	45	23.33	201	4,789	19	23.49	924,828,580	1,286,059,104

Operating Expenses for the Year Ending February 28, 1893.

MONTHS.	COAL.		Engineers, Firemen and Laborers.	REPAIRS.			SUPPLIES.			GENERAL EXPENSES.			TOTAL.
	Tons.	Cost.		Engines.	Boilers.	Building and Grounds.	Oil, &c	Tools.	Incidentals.	Gas	Telephone.	Superintendence.	
March, 1892	278.17	$678 86	$682 00	$193 03	$273 84	$37 00	$96 38	$9 81	$35 42	$123 10	$8 33	$83 33	$2,221 10
April	323.79	838 05	676 85	18 20	119 10	.....	.....	42 13	20 78	53 85	8 33	83 33	1,860 62
May	284.58	695 99	687 75	3 44	116 50	96 68	29 87	11 00	.....	44 55	8 33	83 33	1,777 44
June	337.19	858 03	707 50	22 91	199 83	1 85	25 62	15 96	.....	35 40	8 34	83 34	1,958 78
July	353.70	802 90	679 97	45 69	156 08	291 15	.....	20 78	15 99	37 20	8 34	83 34	2,141 44
August	344.86	782 83	884 09	52 14	217 65	146 73	84 12	16 28	29 24	40 80	8 34	83 34	2,345 46
September	327.10	742 52	924 19	126 02	57 48	4 89	.....	32 20	21 09	50 70	8 33	83 33	2,050 75
October	335.85	762 38	946 00	.....	4 55	3 38	63 90	3 00	9 10	50 10	8 33	83 33	1,934 07
November	342.41	777 27	947 53	49 06	37 20	32 29	.....	20 60	29 62	52 20	8 34	83 34	2,037 45
December	345.71	784 76	932 37	104 45	242 25	91 26	.....	.....	19 00	58 95	8 33	83 33	2,324 70
January, 1893	350.05	794 61	920 75	64 97	478 96	94 75	65 64	5 57	23 91	68 40	8 33	83 33	2,609 22
February	289.60	657 39	923 75	3 05	541 35	.....	.....	.....	8 71	61 80	8 33	83 33	2,287 71
Shortage	144.23	414 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	414 25
Total, 1892–3,	4057 24	9,589 84	9,912 75	682 96	2,444 79	799 98	365 53	177 33	212 86	677 05	100 00	1,000 00	25,963 09
Total, 1891	3524.08	8,633 29	8,239 41	1,314 36	1,785 15	800 52	417 77	139 35	329 22	529 05	100 00	1,000 00	23,288 12
" 1890	2311.64	5,783 06	8,169 39	409 15	1,617 86	782 61	209 81	78 84	212 47	414 45	100 00	1,000 00	18,777 64
" 1889	3003.90	7,830 77	8,150 19	72 88	1,576 30	932 97	133 93	52 45	614 96	487 95	100 00	1,000 00	20,952 46
" 1888	3124.60	8,832 42	8,243 18	240 52	3,748 70	688 08	292 02	25 14	349 83	548 75	100 00	1,000 00	24,068 64
" 1887	3201.08	8,919 24	8,087 60	257 14	2,004 31	65 89	338 18	33 19	325 26	565 99	100 00	1,000 00	21,697 71
" 1886	3277.77	8,190 61	8,048 50	781 56	962 87	385 98	362 59	107 71	446 28	773 00	100 00	1,000 00	21,159 10
" 1885	2677.90	7,864 43	8,073 02	872 59	5,743 97	894 88	317 41	79 49	602 19	646 80	100 00	1,000 00	26,234 78
" 1884	2916.60	12,069 97	7,106 95	.....	8,195 07	852 74	.....	.....	822 12	749 46	83 10	916 67	30,862 49
" 1883	2242.10	10,118 86	5,445 79	.....	.....	902 12	.....	.....	1,080 83	352 05	222 70	818 47	19,013 97
" 1882	1613.89	7,334 49	4,872 99	.....	.....	1,166 25	.....	.....	894 01	304 80	83 33	583 33	15,239 11
" 1881	2141.60	9,938 01	4,615 41	.....	.....	920 50	.....	.....	1,464 48	365 75	226 67	1,000 00	18,530 83

COAL ACCOUNT — CONSUMPTION FOR 1892 AND 1893.

MONTHS.	ANTHRACITE, PEA AND DUST.			BITUMINOUS.			TOTAL	COAL USED IN POUNDS EACH MONTH.		
	Tons.	Price.	Amount.	Tons.	Price.	Amount.		ANTHRACITE.	BITUMINOUS	TOTAL.
March	188.14	$2 01	$378 16	71.94 14.33 13.76	$3 20 4 20 3 80	$230 21 18 19 52 30	$678 86	421,425	201,675	623,100
April	219.34	2 01	440 87	32.82 40.09 31.54	3 80 4 20 3 30	124 72 168 38 104 08	838 05	491,325	233,975	725,300
May	68.52 BUCKWHEAT. 180.23	2 01 2 27	137 76 341 02	65.83	3 30	217 24	695 99	153,492 BUCKWHEAT. 336,500	147,464	637,456
June	247.28	2 27	561 33	89 91	3 30	296 70	858 03	553,900	201,400	755,300
July	353.70	2 27	802 90	.....	....	.....	802 90	792,300	.....	792,300
August	344.86	2 27	782 83	.....	....	.....	782 83	772,500	.....	772,500
September	327.10	2 27	742 52	.....	....	.....	742 52	732,700	.....	732,700
October	335.85	2 27	762 38	.....	....	.....	762 38	752,300	.....	752,300
November	342.41	2 27	777 27	.....	....	.....	777 27	767,000	.....	767,000
December	345.71	2 27	784 76	.....	....	.....	784 76	774,400	.....	774,400
January, 1893	350.05	2 27	794 61	.....	....	.....	794 61	784,100	.....	784,100
February	289.60	2 27	657 39	.....	....	.....	657 39	648,700	.....	648,700
Shortage	39.74	2 01	79 88	104 49	3 20	334 37	414 25	89,010	234,057	323,067
Total	3,602.53	2 23	8,043 65	454.71	3 40	1,546 19	9,589 84	8,069,652	1,018,571	9,088,223

The cost of operating the pumping works during the year ending February 28, 1893, was $25,963.09, as follows:

Cost of coal and wood	$9,589 84
" labor	9,912 75
" repairs	3,927 73
" supplies	755 72
" superintendence	1,000 00
" gas	667 05
" telephone	100 00
Total	$25,963 09

The average cost in coal per million gallons pumped since the starting of the works is here given:

The average cost in coal for the year	1881 was	$8 22
" " " "	1882 "	7 84
" " " "	1883 "	7 51
" " " "	1884 "	6 83
" " " "	1885 "	4 82
" " " "	1886 "	4 28
" " " "	1887 "	4 79
" " " "	1888 "	5 09
" " " "	1889 "	4 51
" " " "	1890 "	4 43
" " " "	1891 "	4 30
" " " "	1892 "	4 34—mean $5 58

Average tons of coal burned per million gallons pumped in	1881	1.77
" " " " "	1882	1.70
" " " " "	1883	1.68
" " " " "	1884	1.65
" " " " "	1885	1.64
" " " " "	1886	1.73
" " " " "	1887	1.72
" " " " "	1888	1.79
" " " " "	1889	1.73
" " " " "	1890	1.76
" " " " "	1891	1.75
" " " " "	1892	1.84

Annual op
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THE FOLLOWING EXHIBITS THE COST EACH YEAR WHILE THE MACHINERY HAS BEEN IN OPERATION:

	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	Mean in 12 years.
Annual operating expenses.	[illegible]	[illegible]	$19,013 97	$30,862 49	$26,334 78*	$21,159 10	$21,097 71	$24,068 64	$20,952 46	$18,777 64	$23,288 12	$25,963 09	$22,157 33
Cost per million gallons raised 231 feet high	[illegible]	[illegible]	11 24	17 41	16 09	11 20	11 06	13 82	12 07	14 37	11 60	11 75	13 79
Cost per million gallons raised one foot high	[illegible]	[illegible]	.0616	.0753	.0696	.0484	.0505	.0600	.0522	.0622	.0502	.0509	.0604

* The item of boiler setting is included in the annual expenses of both 1884–5.

Cost per day of coal at six millions pumpage, 1881 to 1886, old setting	$42 24
Cost per day of coal at six millions pumpage, 1886, Jarvis setting	25 68
Cost per day of coal at six millions pumpage, 1887, Jarvis setting	28 74
Cost per day of coal at six millions pumpage, 1888, Jarvis setting	30 54
Cost per day of coal at six millions pumpage, 1889, Jarvis setting	27 06
Cost per day of coal at six millions pumpage, 1890, Jarvis setting	26 58
Cost per day of coal at six millions pumpage, 1891, Jarvis setting	25 80
Cost per day of coal at six millions pumpage, 1892, Jarvis setting	26 04

As a matter of interest, in connection with the subject of the expense of the water supply, the percentage which the above several items have constituted of the *entire cost of each year* since the pumping machinery has been in operation, is presented in the following table:

ITEMS OF COST.	PER CENT. OF THE TOTAL COST.												Mean of 12 years.
	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	
Fuel	53.6	48.1	53.6	39.0	30.0	38.7	41.1	36.8	37.3	30.8	37.0	37.6	40.3
Labor	24.9	32.0	28.7	23.6	31.0	38.0	37.2	34.3	38.9	43.5	35.4	38.1	33.8
Supplies	7.9	6.0	5.7	2.6	3.8	4.8	3.4	2.7	3.8	2.7	3.8	2.7	4.3
Superintendence	5.4	3.8	4.3	3.0	3.8	4.5	4.7	4.1	4.8	5.4	4.3	3.7	4.3
Repairs	5.0	7.5	4.7	29.0	27.8	10.6	10.7	19.4	12.3	14.9	16.8	15.1	14.5
Gas	2.0	2.0	1.8	2.4	2.2	2.0	2.5	2.2	2.4	2.2	2.3	2.5	2.2
Telephone	1.2	0.6	1.2	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.3	0.6
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The total *expenditures* and the items for "repairs" for the eleven years have been as follows:

1881	$ 920 50	$18,530 83
1882	1,166 25	15,239 11
1883	902 12	19,013 97
1884	9,047 81	30,862 49
1885	7,511 44	26,234 78
1886	2,130 41	21,159 10
1887	2,327 94	21,697 71
1888	4,677 30	24,068 64
1889	2,582 21	20,952 46
1890	2,809 62	18,777 64
1891	3,904 03	23,288 12
1892	3,927 73	25,963 12
Total	$41,907 36	$265,787 97
Mean for 12 years	3,492 28	22,148 99

From the quantity of water pumped during the year, and the cost of the service, may be deduced the following:

Cost per million gallons, raised 231 feet	$11.75
" " " " 1 foot	.0509

The increase in the price per million gallons pumped in the years 1884 and 1885 over 1883 is wholly occasioned by the expense of resetting the boilers; deducting this item of cost for the purpose of comparison with former years, the result would be as follows:

Cost per million gallons raised 231 feet high:

1881.	1882.	1883.	1884.	1885.	1886.
$15,20	$16.12	$14.24	$12.82	$12.57	$11.20
1887.	1888.	1889.	1890.	1891.	1892.
$11.66	$13.82	$12.07	$14.37	$11.60	$11.75

Cost per million gallons raised one foot high in cents:

1881.	1882.	1883.	1884.	1885.	1886.
6.58	6.97	6.16	5.55	5.44	4.84
1887.	1888.	1889.	1890.	1891.	1892.
5.05	6.0	5.22	6.22	5.02	5.09

The engineer's estimate (Report of 1877) of cost per million gallons pumped into Lower Oakwood was $13.09. The actual cost this year has been $11.75, or a decrease of

2210 millions at $13.09	$28,928 90
2210 millions at $11.75	25,967 50
Cost less than the estimate	$2,960 40

This is based on full number of million gallons without figuring on the fractional part over the 2210 millions. The cause of the decrease is on account of the larger quantity of water pumped.

The amount of water pumped since the starting of the log, the rainfall for each month, and the average pumpage for each month, is shown in the table of "Gallons of Water Pumped."

GALLONS OF WATER PUMPED.

MONTHS.	1880.		1881.		1882.		1883.		1884.		1885.		1886.		1887.		1888.		1889.		1890.		1891.		1892.	
	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches	Gallons Pumped.	Rain Fall in inches
March			91,118,877	3.80	1,760,074	1.79	72,720,226	1.77	40,510,984	4.00	125,795,700	.62	159,963,640	2.73	183,075,719	2.99	126,047,020	5.02	102,510,305	1.76	53,078,975	3.72	32,426,242	3.12	154,300,027	1.64
April			91,319,325	1.34	90,127,803	1.27	90,170,466	2.05	50,345,067	2.09	155,974,900	2.80	62,300,620	3.67	21,786,402	2.40	28,014,235	1.95	152,351,014	1.25	66,774,955	1.64	107,727,502	2.27	154,268,567	.56
May			105,215,420	3.00	75,313,386	1.15	106,045,065	3.20	150,774,485	2.79	104,093,430	1.92	135,811,584	3.40	101,112,721	2.27	183,458,781	2.98	101,288,005	3.32	84,422,605	5.19	101,438,470	1.99	167,100,004	5.30
June			118,278,603	3.70	47,717,033	3.98	106,099,835	6.30	152,201,750	1.80	102,201,017	1.98	183,521,345	3.19	150,339,535	2.99	102,813,554	3.58	107,317,450	6.43	150,573,142	2.72	127,276,614	2.65	193,005,102	4.41
July			103,138,502	2.22	33,399,974	3.97	111,002,355	5.96	185,489,307	5.04	150,416,114	1.98	177,091,567	2.50	179,424,024	4.61	177,493,644	2.52	181,892,007	4.19	193,080,767	2.37	196,766,356	6.11	196,530,595	4.22
August			111,235,734	2.07	106,945,912	1.38	124,108,098	3.60	170,521,667	5.27	175,410,595	7.57	197,100,040	.87	195,188,633	4.61	187,277,301	1.74	126,518,340	3.03	172,300,000	5.06	159,202,274	5.88	146,080,723	6.70
September			113,483,350	2.38	92,967,196	7.79	112,503,180	3.19	147,075,800	1.80	172,008,950	2.00	181,025,437	2.51	190,504,555	1.04	186,027,975	4.08	146,256,432	3.68	125,600,600	8.91	101,308,357	1.04	184,212,062	2.08
October			108,152,337	3.19	101,775,610	.27	100,502,784	3.40	161,044,762	2.64	169,222,668	5.54	197,537,855	2.43	173,815,599	2.22	194,077,087	6.10	183,210,300	3.48	100,040,940	5.76	166,235,560	2.13	193,244,574	.60
November	80,553,603	2.40	115,203,557	3.44	104,251,002	.97	112,072,525	1.14	182,230,870	3.44	48,464,930	3.00	173,130,570	5.40	168,815,634	4.30	168,866,648	4.48	140,305,321	5.00	118,231,400	1.18	189,440,650	2.43	191,051,618	2.29
December	93,431,378	1.00	101,340,957	4.88	108,301,040	2.21	137,086,777	2.55	166,258,103	3.20	112,912,692	1.54	190,779,060	2.10	136,424,001	5.43	151,718,778	3.30	115,326,277	2.14	188,220,703	2.94	190,103,417	3.23	193,582,650	.82
January	124,891,709	2.02	88,002,709	2.64	107,415,475	2.43	159,758,296	2.98	174,306,447	3.00	110,749,102	3.66	160,452,473	3.02	111,090,044	3.04	84,119,618	2.82	104,106,050	2.28	53,083,773	6.12	106,876,574	4.08	194,518,548	1.31
February	94,556,445	2.81	60,532,107	3.31	73,835,042	3.00	89,504,073	3.85	170,153,305	1.38	75,753,077	1.40	69,350,003	2.86	158,046,036	2.07	90,752,013	1.81	80,000,630	2.52	00,000,000	4.14	107,020,240	2.13	161,578,912	4.63
Total	393,433,225		1,213,044,908	36.93	943,562,305	33.24	1,333,026,402	40.77	1,767,004,840	36.54	1,630,500,310	34.07	1,889,414,858	34.83	1,850,926,727	37.93	1,741,860,964	44.58	1,736,863,103	39.68	1,306,773,232	50.35	2,006,301,944	37.60	2,210,557,684	34.56
AVERAGES. For each and every day in the year	1,077,808		3,315,191		2,585,102		3,653,771		4,841,109		4,467,124		5,176,479		5,005,059		4,772,238		4,758,529		3,580,204		5,481,945		6,057,220	
AVERAGES. For each day that the pumps were in operation	3,783,011		3,620,074		3,744,295		4,004,884		5,737,028		4,916,666		6,075,288		6,035,470		5,845,200		5,549,074		5,608,468		6,173,513		6,316,822	

The average daily pumpage, when the machinery was in operation, shows the following yearly ratios of increase and decrease:

1882	increase	over	1881	of	3.4 per cent.
1883	"	"	1882	"	7.0 "
1884	"	"	1883	"	43.2 "
1885	"	"	1884	"	4.8 "
1886	"	"	1885	"	1.0 "
1887	decrease	from	1886	"	0.6 "
1888	"	"	1887	"	3.1 "
1889	"	"	1888	"	5.1 "
1890	increase	over	1889	"	1.1 "
1891	"	"	1890	"	10.1 "
1892	"	"	1891	"	2.3 "

The year 1884 was unduly large in consequence of the change from a head of 105 to 202 feet upon the Lower Service.

Taking the capacity of one set of machinery at seven million gallons per day, for 365 days, we find as follows:

In 1881	the pumpage	equalled	47	per cent.	of the total capacity.
In 1882	"	"	36	"	" "
In 1883	"	"	52	"	" "
In 1884	"	"	69	"	" "
In 1885	"	"	64	"	" "
In 1886	"	"	73.9	"	" "
In 1887	"	"	73	"	" "
In 1888	"	"	68	"	" "
In 1889	"	"	67.9	"	" "
In 1890	"	"	51.1	"	" "
In 1891	"	"	78.5	"	" "
In 1892	"	"	86.5	"	" "

The maximum daily pumpage was on June 30th, 1892, 6,870,833 gallons, or $98\frac{1}{10}$ per cent. of the capacity of the pumps. The maximum monthly pumpage was during August of 6,344,539 gallons per day, or $90\frac{6}{10}$ per cent. of the capacity of the pumps.

The average for the 350 days pumping was 6,316,822 gallons, or 90 per cent. of the capacity of the pumps.

The force at the pumping station under Chief Engineer Soucy has been materially changed since the last report. The Board at a meeting held July 15th, 1892, took the following action: "On motion of Commissioner Whelan it was decided that eight hours should constitute a day's work for the assistant engineers, oilers and firemen at the station on and after the 1st of August, 1892." In consequence of this action the force was increased by one assistant engineer, one oiler and two firemen. The work of the employees has been well done and they are deserving of credit for the intelligent and faithful manner in which they have performed their duties during the past year.

During the year the following repairs were made to the buildings at the station and engines and boilers: Repairing line fence between the Pine property and station; enlarging coal bins outside; New feed and blow-off pipes to boilers; 55 feet of new steam pipe to hoisting engine; Rebuilding furnace and bridge walls of Nos. 3, 4, 5 and 6 boilers; also substituting brick in place of cast-iron plate to back connection of Nos. 2 and 3 boilers; Repairing woodwork of tenement house, painting and varnishing the same with two coats of paint and varnish; Repairing No. 2 engine air pumps and connecting rod; Putting on new water valve casing on left back of No. 1 engine; Repairing track and planking of coal run; Repairing roof of main building; also two new valleys over boiler house and repairing gutter to tenement house.

Engineer Soucy recommends that the following repairs be made at the pumping station to building and grounds, engines, etc.: New grating for west side ot inlet pier; Drain to cellar of tenement house; Repairs to present system of air pumps or apply an independent condenser; Improve system to feed water to boilers; New packing ring to piston of steam cylinder.

CONCLUSION.

There is nothing to be added to the recommendations contained in my last report, which called for the extension of mains whenever petitioned for and to continue the 24-inch main southwardly to the Poestenkill.

Respectfully submitted,

EDWARD DOLAN,
Superintendent.

SUMMARY OF STATISTICS.

REPORT OF 1892.

In accordance with suggestions adopted by the New England Water Works Association.

TROY WATER WORKS, RENSSELAER COUNTY, N. Y.

Population by State Census, 1891...65,000
Date of construction.....1833 to 1893
By whom owned.....The City of Troy.

SOURCE OF SUPPLY:

From a series of five artificial storage reservoirs constructed in the valley of the Piscawankill, whose watershed is equal to 1,363 acres, and the Hudson river at Lansingburgh, three miles above Troy.

MODE OF SUPPLY:

The water collected is distributed by gravitation, as is also the Hudson river water after being pumped to an elevation of 231 feet.

PUMPING.

1. Builders of Pumping Machinery:

Holly Manufacturing Co., of Lockport, N. Y., two sets of quadruplex engines of 6,000,000 gallons capacity, with piston speed of 90 feet.

Dimensions of parts:

Steam cylinders to each engine.....4
Diameter.....27 inches
Length of stroke.....36 inches

Air pumps and condensers, each engine.....2
Diameter.....29.75 inches
Stroke.....30 inches
Fly wheel to each engine.....1
Diameter.....13.33 feet
Width of rim.....12 inches
Depth of rim.....12 inches
Weight.....9 tons
Extreme length of each engine.....48.5 feet
Extreme width of each engine.....18.83 feet
Extreme height of each engine.....31 feet
Pump cylinders to each engine.....4
Diameter.....17.75 inches
Length of stroke.....36 inches
Displacement per revolution, U. S. 302.48 galls
Number of valves in each pump.....832
Diameter of each valve.....1.375 inches
Lift of valve.....33 inches
Diameter of suction and discharge pipe, each pump.....14 inches
Length of force main.....16,722 feet
Diameter of force main.....30 inches
Height of pumps above low water.....20 feet
Height of summit of force main above low water.....234.07 feet
Height of wash stone gate house, lower Oakwood.....231 feet
Boilers, "Jarvis setting," number of.....6
Diameter of shell.....5 feet
Length of shell.....17.33 feet
Number of tubes, each boiler.....58
Diameter of tubes.....3.75 inches
Total heating surface, each boiler..1,141 sq. ft
Diameter of chimney flue.....4.33 feet
Height of chimney above grade.....100 feet

2. Description of coal used:
   a. Anthracite
   b. Bituminous.
   c. Size—Broken, screenings and buckwheat.
   d. Brand—B, Clearfield, Pa., A. Lehigh.
   e. Price—Mine screenings, $2.01.
   bituminous, $3.20, $4.20 and $3.80.
   buckwheat, $3.30.
   f. Percentage of ash, 18.02.
   g. Wood, price per cord, $6.00.
3. Coal consumed for the year, in pounds:
   Anthracite 8,069,652
   Bituminous 1,018,571
4. Pounds of wood consumed,
   ——————————=coal in pounds,——————
5. Total fuel consumed for the year 9,088,223
6. Total pumpage for the year, in gallons, 2,210,887,684
7. Average static head against which pumps work..... 231 feet
8. Average dynamic head against which pumps work..... 242 feet
9. Number of gallons pumped per pound of coal, 245.26
10. Duty, in foot pounds, per 100 pounds of coal, using following formula, making no deductions for starting, banking fires, heating buildings or anything else:

$$\text{Duty} = \frac{\text{gallons pumped} \times 8.34 \text{ lbs.} \times 100 \times \text{dynamic head}}{\text{Total fuel consumed}} = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 49,098,601$$

Cost of pumping figured on pumping station expenses, viz $25,963 04

11. Per million gallons raised against average dynamic head into reservoir..... 11 75
12. Per million gallons raised one foot high, dynamic..... 0.509

	Cost of pumping and gravity supply combined, figured on total maintenance and interest at 4 per cent. on construction	$108,645 45	
13.	Cost per million gallons		36 11
14.	Receipts per million gallons		28 84

CONSUMPTION.

1.	Total population at date, State census, 1892		65,000
2.	Estimated population on lines of pipe to date		60,000
3.	Estimated population supplied at date		58,000
4.	Total number of gallons consumed for the year	3,207,887,684	
5.	Passed through domestic meters	357,121,000	
6.	Passed through manuf. meters		
7.	Average daily consumption in gallons	8,240,788	
8.	Gallons per day to each inhabitant	127	
9.	Gallons per day to each consumer	142	
10.	Gallons per day to each tap	1,122	

DISTRIBUTION.

1.	Kind of pipe used	cast iron
2.	Size	4 to 30 inch
3.	Extended	4,535
4.	Discontinued	0
5.	Total now in use	57.7
6.	Cost of repairs per mile	$7.10
7.	Number of leaks for the year	35
8.	Small distribution pipe, less than 4 inch	3,100 feet
9.	Hydrants added	19
10.	Number now in use	717
11.	Stop gates added	35
12.	Number now in use	1,142
13.	Small stop gates, less than 4 inches	*no record*
14.	Number of blow-offs	35

15. Range of pressure day and night:
    High service ..... 11 to 107 pounds
    Middle service ..... 9 to 105 "
    Low service ..... 11 to 60 "

SERVICES.

16. Kind of pipe used ..... AA lead and cast iron
17. Size ..... ¾ to 6 inch
18. Extended ..... *no record*
19. Discontinued ..... *no record*
20. Total now in use 7,281
21. Service pipes added 321
22. Average length of service, estimated ..... 35 feet
23. Average cost of service, estimated $25.00
24. Meters added 18
25. Meters discontinued 9
26. Number now in use 239

FINANCIAL.

MAINTENANCE.

RECEIPTS.			EXPENDITURES.		
From Consumers:					
A.	Water rates, domestic	$66,480 02	AA.	Management and repairs	$59,368 06
B.	Water rates, meters, sprinkling etc.	18,861 53	BB.	Interest on debt	13,885 00
C.	Net receipts from water	$85,341 55			
D.	Miscellaneous (repairs, rent, etc)	8,169 31	CC.	Total maintenance for year.	73,253 06
E.	Total	$93,510 86		Am't paid to Sinking Fund for redemption of Bonds.	17,925 00
From Public Funds:			DD.	Balance to Construction	2,332 80
J.	General appropriation for water General appropriation for debt				
K.	Gross receipts from all sources.	$93,510 86	KK.	Total	$93,510 86

FINANCIAL — CONTINUED.

CONSTRUCTION.

	RECEIPTS.			EXPENDITURES.		
R.	Balance from previous year	$35,723 86	FF.	Extension of mains	$10,951 99	
	Balance from maintenance	2,332 80	GG.			
S.	From sale of bonds		HH.			
T.	Appropriation from tax levy		II.	Total construction for year	10,951 99	
U.	Other sources, (service, private meters)		JJ.	Balance to coming year	27,104 67	
V.	Total	$38,056 66	KK.	Total	$38,056 66	

W.	Net cost of works to this date	$1,231,934 95
X.	Bonded debt at this date	341,000 00
Y.	Sinking fund	36,437 50
Z.	Average rate of interest	4 per cent.

REPORT

ON

AN ADDITIONAL WATER SUPPLY

FOR THE

CITY OF TROY,

MADE TO THE WATER COMMISSIONERS

BY

ELNATHAN SWEET AND WM. G. RAYMOND,

TOGETHER WITH

ANALYSES OF THE WATERS FROM THE DIFFERENT SOURCES EXAMINED,

By Prof. William P. Mason.

TROY PRESS COMPANY, FULTON AND FOURTH STS.
1893.

LETTER OF INSTRUCTION.

OFFICE BOARD
OF WATER COMMISSIONERS,
TROY, N. Y., *November* 26, 1892.

MESSRS. WM. G. RAYMOND AND ELNATHAN SWEET,

GENTLEMEN:

You have been appointed by the Board of Water Commissioners of the city of Troy, as engineers for obtaining an additional supply of water for this city.

You are requested to examine instrumentally the water-shed of the Poestenkill above the Millville dam, to determine separately the drainage area of the Quackenkill and the Poestenkill to ascertain the most feasible sites for storage reservoirs and their respective capacities and the most advantageous route for a pipe-line to conduct the water to our present system, and if possible, into Brunswick Lake.

In procuring this additional supply of water ten million gallons a day will be required at once, with the opportunity of increasing the quantity to double that amount in the future, without much increased cost.

A general plan for the proposed work will be expected together with the cost of executing the same.

You are further requested to consider the expediency of procuring an additional supply of at least five million gallons a day by pumping from the Hudson River, making provision in this plan for elevating sufficient water to supply the middle service whenever it may become necessary to do so, and also providing

for an increase of head on the high service, so as to be able to furnish water to the highest portion of the city, which the present system cannot supply. The plan and estimate of the cost of this proposed work will accompany your report.

It is desired that you present any considerations or suggestions bearing on the question which you may deem advisable, and in general terms to treat the subject with the broadest scope.

Respectfully,

RICHARD F. HALL,
DAVID C. BRIGGS,
Committee on behalf of the Water Com'rs.

REPORT.

TROY, N. Y., March 3, 1893.

TO THE HON. BOARD OF WATER COMMISSIONERS OF THE CITY OF TROY,

GENTLEMEN:

In accordance with the instructions contained in the foregoing letter, we beg to report to you as follows:

Immediately upon the receipt of your letter of instruction we met to discuss the best methods for making the necessary investigation to secure a fairly correct estimate of the most suitable plan for delivering to Troy the waters of the upper Quackenkill and Poestenkill.

There were available topographical maps showing the water-shed of the Poestenkill, but none of the Quackenkill.

It was thus seen to be necessary to make a survey to determine the area of the water-shed of that stream.

Personal examination of the water-shed satisfied us that its extent is so small that a very extensive development of its storage capacity will be necessary to fully realize its entire capacity, and indicated the advisability of determining the area of water-shed tributary to each of the natural lakes and ponds within the area drained by the Quackenkill and the extent to which these lakes may be utilized for storage purposes.

The personal examination also revealed the fact that storage sites along the stream are few and of limited capacity.

It therefore was necessary to such an investigation as your letter required that somewhat careful measurements should be made to determine the extent of storage possible at each site.

We have thus carefully examined the Quackenkill, because the report of your chemist, Professor Mason, has indicated the superior quality of the water of this stream, and also because it offers a nearer source of supply than the Poestenkill, and it was hoped that it would furnish the immediate requirement of ten millions of gallons daily.

It being very desirable, as pointed out in your letter, to deliver a new supply into Brunswick Lake, your highest and largest storage reservoir, it was decided that careful levels should be run from Troy along the Poestenkill and Quackenkill to determine the elevation of suitable reservoir sites, and also that a preliminary line should be run from near Cropseyville to Brunswick Lake to determine the practicability of a pipe line to deliver the water at this point.

It was further determined to examine instrumentally the capacity of storage sites on the upper Poestenkill.

It was not considered necessary to survey a pipe line from any point on this stream, as a sufficiently exact report may be made concerning it from existing maps, combined with the survey from Cropseyville.

As it was deemed desirable to hasten the work, in order to present a report in time for action by your Honorable Board before the close of the present session of the Legislature, it was deemed advisable to put two parties in the field with instructions to hasten their work as much as possible.

Accordingly Mr. George Yost and Mr. M. R. Sherrerd were employed to organize the parties, and personally conduct their work.

To Mr. Yost was entrusted the area survey of the water-shed of the Quackenkill above the village of Quackenkill, the area surveys of the separate water-

sheds tributary to the various ponds or lakes, and the examination of these ponds as to storage capacity, and also the examination as to the capacity of several of the possible storage sites along this stream, and one on the Snyder branch of the Poestenkill.

To Mr. Sherrerd was entrusted the work of determination of elevations, the conduct of the preliminary survey for pipe line, and the measurement of the capacities of a number of possible storage sites, on both the Quackenkill and Poestenkill water-sheds.

The most rapid modern methods were adopted for these surveys, and it is believed that when the unusual severity of the weather during almost the whole period covered by the survey is considered, the cost of the work, measured by what has been accomplished, is very low. The work that has been done is as follows :

The area of the Quackenkill water shed above Quackenkill village has been determined and a skeleton map of the same prepared. Levels have been run from Troy along the Poestenkill, leaving permanent bench marks at intervals, to Millville, junction of Quackenkill, Poestenkill village, Barberville and junction of Snyder Branch ; along the Quackenkill to Quackenkill village and to a reservoir site at Hicks's Flat, about a mile above the village.

A preliminary survey for a pipe line from a reservoir site above Rock Hollow, on the Quackenkill, to Brunswick Lake, has been made, and a map and profile of the line prepared.

The areas tributary to Long Pond, Middle Pond, Mill Pond, Shaver's Pond, White Lily Pond and Cranberry Pond have been measured and contours taken around each of these ponds, except Cranberry Pond, to determine the capacity of each for the development of storage.

The ponds have been mapped, their capacities computed and the estimate of cost of necessary dams made.

Contour surveys have been made of six pond sites on the Quackenkill, two on the Snyder branch of the Poestenkill and two on the Poestenkill proper, and each of these sites has been mapped, its capacity computed, and the cost of the necessary dams for such as it was decided to recommend, estimated.

A limited number of borings have been made to determine the nature of the underlying material at the most important pond sites on the Quackenkill.

A skeleton map has been prepared showing the entire water shed of the Poestenkill and Quackenkill and an outline of the general plan herein recommended.

All these maps and plans referred to are herewith submitted.

Investigations have also been made touching the advisability of increasing your pumping capacity and also the head of the high service system. These items will be further mentioned in a later part of this report.

After careful consideration of the capacities and cost of development of all the available storage sites on the Quackenkill and the principal sites of the Poestenkill, we have determined to present for your consideration two plans of development:

1.—An immediate maximum development of the Quackenkill, subsequently required supplies to be drawn from the Poestenkill.

2.—An immediate partial development of both streams, subsequently required supplies to be drawn from either stream as may seem desirable, but principally from the Poestenkill.

The immediately required constructions for these plans are as follows:

I.

FULL DEVELOPMENT OF QUACKENKILL.

Probable yield in dryest years eight millons gallons daily.

Long Pond	$5,000 00
Shaver Pond	26,020 00
White Lily Reservoir	53,100 00
Hicks's Reservoir	151,500 00
Diverting Dam, Site No. 2	21,535 00
35,000 Feet 24-Inch Pipe	175,000 00
Total	$432,155 00
Plus ten per cent	43,215 00
Total	$475,370 00

II.

PARTIAL DEVELOPMENT OF BOTH QUACKENKILL AND POESTENKILL.

Probable yield in dryest years ten million five hundred thousand gallons daily.

	FROM.	TO.
Long and Shaver Ponds	$31,020 00	$31,020 00
Simmon's Flat Reservoir	62,800 00	72,800 00
Hicks's Reservoir	63,450 00	63,450 00
Diverting Dam, Site No. 2	21,535 00	21,535 00
35,000 Feet 18-Inch Pipe	105,000 00	105,000 00
50,000 Feet 20-Inch Pipe	175,000 00	175,000 00
Total	$458,805 00	$468,805 00
Plus ten per cent	45,880 00	46,880 00
Total	$504,685 00	$515,685 00

The location of the various sites named in the foregoing may be seen by reference to the general map accompanying the report.

From the above figures it is seen that the first plan requiring slightly less immediate gross expenditure,

is really the more costly plan, measured by the amount of water developed.

By the first plan the cost per million gallons exceeds fifty-nine thousand dollars, while by the second, it is from forty-eight thousand to fifty thousand dollars.

But the more important advantage of the second over the first plan lies in the fact that the future required development of either stream may be obtained from time to time as needed, by moderate expenditure; while the first plan necessitates the further outlay, within a few years, of from two hundred and twenty-five thousand to three hundred thousand dollars for a dam at Simmons's Flat on the Poestenkill and a pipe line thereto.

The only advantage of the maximum development of the Quackenkill is that the quality of its water is somewhat better than that of the Poestenkill.

We desire to say, however, that in our judgment a small expenditure of say twenty-five thousand dollars applied to the draining of the swamps on the Poestenkill, will very materially improve the quality of its water, and will probably render it fully equal to that of the Quackenkill.

Should filtering be deemed indispensable to the use of the waters of the Poestenkill, an entirely different plan is advised, namely, the development of the Quackenkill to the extent of about six million gallons daily for the supply of the high and middle services, and the construction of dam and filtering plant on the Poestenkill near the toll gate, from which would be drawn the water for the low service, and if need be also for the middle service.

Subsequently dams would be needed at several points on the Poestenkill.

This plan, involving less first cost than either of the others, also involves the maintenance of a filter plant, an item quite uncertain in amount, and the plan is not advised unless it be deemed necessary to filter the water of the upper Poestenkill.

As previously stated, it is believed that the drainage of the marshes will obviate the real or fancied need of such filtration.

The complete development of the two streams, as contemplated, up to a yielding capacity of 18 million gallons daily, involves the following constructions to be made, in the order named, as required.

The order is based on the plan of immediate partial development of both streams.

SECOND PLAN.

Complete development to eighteen millions of gallons daily :

Long and Shaver Ponds	from	$31,020 00	to	$31,020 00
Hicks's Flat	"	63,450 00	"	63,450 00
35,000 Feet 18-Inch Pipe (Quackenkill)	"	105,000 00	"	105,000 00
Simmons's Flat	"	62,800 00	"	72,800 00
50,000 Feet 20-Inch Pipe (Poestenkill)	"	175,000 00	"	175,000 00
Total		$437,270 00	to	$447,270 00
Engineering and Incidentals ten per cent	from	$43,727 00	to	$44,727 00
Riparian Damages	"	125,000 00	"	125,000 00
Drainage of Marshes (Advisable in either plan)	"	30,000 00	"	30,000 00
Total Immediate Expenditure,	"	$635,997 00	"	$646,997 00
Cottrell Flat Reservoir	"	42,880 00	"	42,880 00
White Lily Reservoir	"	53,100 00	"	53,100 00
Ives Corners Reservoir	"	138,150 00	"	138,150 00
Conduit Connecting Columbia and Ives Corners	"	14,400 00	"	24,000 00
Columbia Diverting Dam	"	32,400 00	"	32,400 00
Plus Ten Per Cent. Later Expenditure	"	28,093 00	"	29,053 00
Additional Pipe Line Required for Future Development	"	175,000 00	"	175,000 00
Grand Total		$1,120,020 00		$1,141,580 00
Cost Per Million Gallons daily, from		$62,223 00	to	$63,421 00

More detailed estimates of the cost of the various structures will be found tabulated in the appendix.

It is probable that a considerable saving may be made by uniting the two pipe lines some two and one-half miles from Brunswick Lake.

It is believed that the prices for the various items named are fairly high, and the estimate is thought to be an outside one, and it is believed that a considerable reduction may be realized from more careful detailed planning should the works be built.

We strongly advise the early beginning of weir measurements and observations for rain-fall on these streams.

The item of riparian damages is a difficult one to estimate, and we have intentionally made no detailed report of this item.

We believe the damage may be fully compensated by the amount named elsewhere in this report, if not by outright purchase, certainly by furnishing an equivalent supply of water from a compensation reservoir, and we would advise the consideration of this matter in such legislation as your Honorable Board proposes to secure.

ADDITIONAL PUMPING CAPACITY.

We have considered the suggestion made in your letter of instruction, asking us to report on the expediency of increasing the capacity of your present pumping plant to the extent of five million gallons daily, and the raising of a portion of the supply to the elevation of your middle service.

We have examined the pumping plants you have now in use, and find that though the pumps have a capacity for increasing the supply to the extent suggested, the force main gives a good deal of trouble under the work now put upon it, and the pumps show an effective duty so low as to make their operation far from economical.

To carry out the proposed increase of pumping capacity, the highest economy would doubtless be found in substituting high duty pumps of at least fifteen million gallons daily capacity, furnishing appropriate boiler capacity for effectively operating such pumps, and replacing the present force main by a 36-inch riveted steel main, extending to the middle service reservoir.

These changes involve the expenditure of about two hundred and fifty thousand dollars, and the definite adoption of the Hudson River as a source of supply would, we think, in view of the analysis of its water, soon require the introduction of a filtering system to give you a satisfactory water service.

As the cost of pumping this increased supply, together with the capitalization of the cost of the improvements and renewals, make water supplied from this source so greatly exceed in cost that supplied by the gravity plan we have outlined, that such increased pumping capacity seems to us inexpedient, apart from the question as to whether filtration is requisite to render the river water suitable for a public supply.

INCREASED HEAD FOR HIGH SERVICE.

It is certainly quite necessary to increase the head over a portion of the city that it is now impossible to serve, and at the same time there are two or three points on the high service system at which the pressure is already as great as the pipes will bear.

We advise, to meet this requirement, the continuation of the 20-inch main of the high service to Vanderheyden Lake, and the replacing of the pipe in the low districts with pipe of greater strength.

The estimated cost of this improvement is thirty-seven thousand dollars.

We might go further into details concerning the method of study pursued by us in this investigation, but deem it unnecessary for the purpose of this report.

Suffice it to say that our conclusions have been reached after a most careful consideration of all points that have presented themselves to our minds, and we feel satisfied that, while further study might modify the details of the plans suggested, nevertheless the general scheme will be found to be on the whole well adapted to the requirements of the city as expressed in your letter of instruction.

Very respectfully submitted,

E. Sweet,
Wm. G. Raymond.
Engineers.

APPENDIX.

DATA CONCERNING NATURAL PONDS AND STORAGE SITES ON QUACKENKILL AND POESTENKILL.

Mill, Second and Long Ponds.

Slight repairs to the dams already built at these ponds will impound sufficient water to fully develop the areas tributary to them. The cost of such repairs is estimated at seven thousand dollars.

Long Pond.

Drainage Area..... 520 Acres
Water Area..... 105 5-10 Acres
Dam 10 Feet High Impounds..... 400,000,000 Gallons

Second Pond.

Drainage Area..... 260 Acres
Water Area..... 27 5-10 Acres

Mill Pond.

Drainage Area..... 113 Acres
Water Area..... 17 5-10 Acres

White Lily Pond.

Drainage Area..... 360 Ares
Water Area..... 23 8-10 Acres

Not favorable for impounding. It would be advisable to drain the marsh surrounding it.

Shaver Pond.

Drainage Area..... 363 Acres
Water Area..... 46 3-10 Acres
Dam 15 Feet High Impounds..... 281,000,000 Gallons

It may prove wise to lower this pond and build a lower dam.

Cranberry Pond.

This pond with a water surface of 20.1 acres is surrounded by large marshes which should be drained.

This can be done at a small cost, and will probably very materially improve the quality of the water as well as reclaim the land.

Reservoir Site No. 1.

At this site a masonry diverting dam has been planned, from which the pipe line to Brunswick Lake may take its beginning.

Site No. 2.

At this point a masonry diverting dam has been planned and it was found more economical to begin the pipe line at this point because the increased head permitted a reduction in diameter of pipe.

Hicks's Flat.

Capacity Flowing 100 Acres..... 707,000,000 Gallons
Capacity Flowing 58 Acres..... 288,157,500 Gallons

White Lily Reservoir.

Drainage Area..... 3 1-10 Square Miles
Capacity Flowing 38.2 Acres..... 205,653,000 Gallons

Simmons's Flat Reservoir.

Capacity Flowing 61.1 Acres..... 212,000,000 Gallons

Ives's Corners.

Capacity Flowing 150 Acres..... 850,000,000 Gallons

Cottrell's Flat.

Capacity Flowing 42.4 Acres..... 197,000,000 Gallons

Columbia Diverting Dam.

At a point on the Poestenkill about one-half mile above the Ives's Corners Reservoir, it is proposed to build a diverting dam, to divert the water of the Poestenkill to a conduit that shall convey it into the Reservoir at Ives's Corners, which Reservoir is to be built on the watershed of the Snyder Branch, and is much larger than necessary for the development of that branch alone.

There is no more available storage site on the Poestenkill proper.

ANALYSES OF THE WATERS.

BOARD OF WATER COMMISSIONERS, CITY OF TROY,

GENTLEMEN:

Following instructions received from Commissioner Hall, I took samples of water from the Poestenkill and Quackenkill streams on November 5, 1892, at points indicated by him, namely:

Sample No. 1—From the head of the high falls of the Poestenkill at Barberville.

Sample No. 2—From the Quackenkill just above Rock Hollow.

Sample No. 3—From the Poestenkill just above Millville and below the junction of the Quackenkill.

Upon November 7, 1892, there was added to these:

Sample No. 4—From the present intake of the Hudson River pumping station.

At the time of taking samples Nos. 1, 2 and 3 there had been little or no rain during many weeks, and the streams were very low.

At the time of taking sample No. 4 the Hudson River was low and a violent south wind was blowing, which produced a sea fully three feet high, thereby materially affecting the character of the water entering the intake.

In all cases the taking of surface water was avoided. The large samples for chemical examination having been carefully secured, smaller samples were obtained in hermetically sealed glass bulbs, for use in the bacteriological examination.

No interval was permitted between the time the samples reached the laboratory and the beginning of the analyses.

METHODS OF ANALYSIS.

Space does not here permit of a detailed description of the methods of analysis. Let it suffice to say that the general recommendations of the water committee appointed by the American Association for Advancement of Science, of which committee the writer is a member, were followed, and that full analytical details may be found in a publication of mine, issued in 1890, upon the "Examination of Potable Water." All the waters were carefully examined for poisonous metals, with negative results, and all were found to be "soft" in their action upon soap.

LOOKING FOR BACTERIA.

Results of bacteriological examination.—It should be here stated that for the purpose of this examination a measured quantity of water — namely, one cubic centimeter — is carefully introduced into a tube containing melted sterilized nutrient gelatine, mixed with the same, and then the mixture is poured into a flat, covered glass dish, which dish has been previously also sterilized, and is allowed to "set" therein. Each bacterium, finding the jelly a source of abundant food, immediately proceeds to reproduce its own kind, and before the lapse of many hours becomes surrounded by myriads of its progeny, the "colony" thus produced appearing as a whitish spot large enough to be seen with the naked eye. By counting these "colonies" a knowledge is obtained of the number of bacteria originally present in the cubic centimeter of water. The greater the number of "colonies," and the more rapidly they appear and develop, the poorer the rating given the water. The samples in question gave the following results:

No. 1, Poestenkill, after 24 hours, none.
No. 1, Poestenkill, after 36 hours, none.
No. 1, Poestenkill, after 48 hours, none.
No. 1, Poestenkill, after 60 hours, 970.

No. 1, Poestenkill, after 84 hours, gelatine partly liquified.

No. 2, Quackenkill, after 24 hours, none.

No. 2, Quackenkill, after 36 hours, none.

No, 2, Quackenkill, after 48 hours, none.

No. 2, Quackenkill, after 60 hours, 462.

No. 2, Quackenkill, after 84 hours, less liquid than No. 1.

No. 3, Millville, after 24 hours, none.

No. 3, Millville, after 36 hours, none.

No. 3, Millville, after 48 hours, none.

No. 3, Millville, after 60 hours, 979.

No. 3, Millville, after 84 hours, same as No. 1.

No. 4, Hudson river, after 24 hours, none.

No. 4, Hudson river, 36 hours, 626.

No. 4, Hudson river, after 48 hours, gelatine partly liquified.

Placed in the order of purity, as judged by the bacteriological examination, the waters would stand: First, No. 2, Quackenkill; second, Nos. 1 and 3, Poestenkill; third, No. 4, Hudson river.

CHEMICAL EXAMINATION.

The results of the chemical examination, expressed in parts per million, are given in tabulated form at the end of this report.

THE CONCLUSIONS.

After careful study of the results obtained in this investigation, I have arrived at the following conclusions with regard to the desirability of drawing the water supply of Troy from the several sources sampled:

The Poestenkill at Barberville furnishes water which would not be acceptable as a city supply, the objection being that it contains altogether too much "peaty" material. Its color is distinctly yellow and contains more or less sediment (about as much as the Hudson River sample), which, however, could be lessened in

quantity by suitable settling. In general appearance this water is inferior to the other three. So far as the effect of a peaty water upon health is concerned, it is my experience that it induces a marked, although transient, diarrhœa among those unaccustomed to its use. It is also my experience, however, that such a water may be rendered entirely colorless and wholesome by appropriate filtration. During the past summer a water came under my observation which had a much deeper color than the Poestenkill, but after passing through a filter of the modern American type, such as is now being put in by the cities of New Orleans and Philadelphia, the water issued clear and perfectly colorless. An interesting case, showing the action of peaty water as well as the beneficial results of filtration, occurred at Long Branch in 1887. By the breaking of a dam the strongly peaty water of Cranberry Creek was delivered directly into the public water mains without the advantage of previous sedimentation. An epidemic of diarrhœa followed, affecting numbers of the summer visitors and causing widespread complaint. A filtering plant was put in and the use of Cranberry Creek water continued. Since that period the quality of the supply has been perfectly satisfactory.

If Troy chose to institute a filtering plant there is no question but what the darkest colored water from the Poestenkill could be rendered both clear and desirable. The expense of such a plant is comparatively small. Basing the estimate upon the highest figures, Troy could filter its entire water supply at a cost not to exceed six dollars per million gallons, or about half a cent per thousand gallons, and such an estimate would include four per cent interest on the bonded first cost of the plant, as well as the yearly expense of labor and repairs.

The Quackenkill, at Rocky Hollow, furnishes water suitable for the city supply. It is softer than Hudson River water, which is a valuable consideration for laundry and boiler interests, and it is free from organic contamination, with the exception of a small amount of

"peaty" material, which gives it a slight yellow tint. When viewed through a depth of two feet its appearance is similar to that of Hudson River water, except that it contains little or no sediment. In general character it is not inferior to what the Croton supply of New York was on practically the same date—i. e, November 2, 1892 (see tabulated analyses), and it is superior to the New York supply as delivered on August 25 last (see tabulated analyses). The comparatively high figures for "albuminoid ammonia" and "required oxygen" are due to the presence of the small amount of fresh peaty matter already referred to.

The use of this water for public supply may be undertaken with entire safety, always providing that proper care be taken of the water-shed and storage-basins. It may not be amiss to here point out that regulations for the protection of a water-shed which do well enough during summer months may entirely fail of effectiveness after the ground becomes frozen. Drainage material which at one time could sink into the ground and become oxidized by infiltration would at other seasons flow down steep slopes over the frozen surface, or, if itself arrested by frost, would be at a later date washed into the stream by melting snows over the yet unthawed ground. Such cases of contamination are not rare, and are at times followed by most serious consequences, as was instanced by the outbreak of typhoid fever at Plymouth some four years ago. It is useless to depend upon the purifying action of frost, for, as Prudden has shown, typhoid germs can withstand being frozen in solid ice during a period of over three months.

The purifying action of filtration through common soil is another point frequently misunderstood, and yet of important bearing when considering the protection of a water-shed. Such filtration is only effective when it is intermittent.

The nitrifying organism which accomplishes the oxidation of the objectionable sewage material can only operate in presence of atmospheric oxygen. A supply

of air must be present in the pores of the soil or else purification ceases. The valuable experiments undertaken at Lawrence, Mass., have abundantly established this fact. After a "dose" of sewage has been applied to a soil, a sufficient interval must elapse to permit the air to renew the exhausted oxygen; otherwise the slow-moving and continuous stream of filth must carry its objectionable properties to considerable distances.

How important, then, that every privy located within drainage distance of a source of water-supply should be built without a vault, and should have its cleanings removed at frequent intervals and applied to successive pieces of ground.

The water from the Poestenkill, near Millville, is perhaps a shade better than water from the same stream at Barberville, owing to the introduction of the purer water of the Quackenkill, but it is still very "peaty," and also contains considerable sediment. I cannot recommend it for a city supply unless it be purified by filtration. What has been said about the upper Poestenkill applies to this water also.

THE RIVER WATER.

The Hudson River sample was unquestionably taken under adverse circumstances. The river was low, a strong south wind was blowing and a sea was running up stream, heavy enough to almost shipwreck our small skiff. Under conditions such as these the river water was deprived of the benefit of such settling as may occur during its ordinarily quiet flow, and was, moreover, damaged by the stirring up of much previously deposited sediment. That the river at the present intake can at times furnish much better water than at the recent date of sampling is shown by the previous analyses of water from the same point made in December, 1884, September, 1885, May, 1890, and July, 1891 (see tabulated analytical results). These older analyses show

also that the water is not constantly of the same composition, a result to have been expected.

All results considered, the present sample of river water does not present features satisfactory for city supply. While admitting that the quality of this sample is much below the general average of the river water, it must be remembered that the people of the city are forced to consume the water as it comes, the good with the bad, without discrimination, and it is, therefore, probably fortunate that the sample was taken under the adverse circumstances stated.

Judging from previous analyses, the Hudson River at Lansingburgh furnishes at times better water than can be obtained from the Poestenkill, owing to the peaty character of the latter; but the fact that very inferior water, such as the present sample, may at times be pumped to the city, renders it fully as undesirable as the Poestenkill supply. Like the Poestenkill, it can be vastly improved by filtration, and, if used, should be so treated.

One thing in connection with the Hudson River water should be distinctly remembered, namely, that its analysis to-day is far from being a measure of its sanitary condition a few years from now. The cities and towns above Troy are beginning to put in sewers, and the day is not far distant when the Hudson will rival the Mohawk in the inferiority of its water. The serious consequences of supplying a town with unpurified water from a sewage-laden source has been fully shown in the typhoid epidemics which have occurred in our sister cities during the last few years. It is useless to hope that nature will take care of the up-stream contamination within reasonable space of time and distance of flow; neither can safety be secured by the aeration incident to the water passing over rifts and falls. Aeration improves the taste of water and aids in preventing the growth of algae; but its value for purposes of direct oxidation is extremely small, as has been

abundantly proven by an investigation conducted in this laboratory during the past year.

Many samples of contaminated water were lashed into spray for days at a time by being placed in large glass vessels fastened to the connecting rod of a fast-moving engine, and were afterward found to have been improved but very little by this opportunity for direct oxidation.

Leeds has shown that the water of the Niagara River is not materially altered by passing over Niagara Falls.

Irrespective of what course may now be decided upon, the time must come when the present Hudson River supply will have to be purified or abandoned.

THE QUACKENKILL APPROVED.

In conclusion, permit me to repeat that, judging of the several waters by characteristics presented on the dates of sampling, I approve of the quality of the Quackenkill water for the purpose of supplying the city of Troy, but for reasons stated I do not approve of the unpurified waters from the other three sources.

Respectfully submitted,

WILLIAM P. MASON.

RESULTS IN PARTS PER MILLION.

Source of Sample.	Appearance.	Color in 2 ft. Tube.	Free Ammonia.	Albuminoid Ammonia.	Required Oxygen.	Chlorine in Chlorides.	Nitrogen in Nitrates.	Nitrogen in Nitrites.	Loss on Ignition.	Mineral residue.	Total solids.	Hardness.
No. 1, Poestenkill at Barberville	Turbid	Dark yellow	0950	3980	14.8	2.4	Trace	0	27.	19.	46.	17.2
No. 2, Quackenkill	Clear	Light yellow	.0550	.2300	7.4	2.4	0	0	20.	14.	34.	17.2
No. 3, Poestenkill at Millville	Turbid	Same as No. 1	.1000	.3080	11.0	2.4	Trace	0	22.	33.	55.	19.2
No. 4, Hudson river	Turbid	Same as No. 2	.1100	.2750	8.7	2.4	0	Trace	25.	44.	69.	32.6
Same, December, 1884			.0400	.1500		3.					56.	
Same, September, 1885			.0300	.1500	4.77	4.5	Trace	Trace			88.	
Same, May, 1890			.0160	.1240	13.35	4.	0	0			76.	
Same, July, 1891			.0400	.1500	8.40	2.5	.041	0				
Croton water, May 12, 1892	Turbid	Light yellow Brown	.0050	.0000		2.32	.037	0	24.	61.	85.	44.3
Same, August 25, 1892	Slightly turbid	Yellowish brown	trace	.2250		2.23	.329	.003	23.	65.	88	55 6
Same, November 2, 1892	Slightly turbid	Light yellow brown	.0050	.1400		2.06	.284	0	22.	61.	83.	53.1

TROY, N. Y., January 24, 1893.

BOARD OF WATER COMMISSIONERS, CITY OF TROY,

GENTLEMEN:

Following your instructions, I went with your engineer, Prof. Raymond, on Saturday, Jan. 14th, 1893, to a point some two miles beyond Barberville, and took samples of water for analysis from the east branch of the Poestenkill (No. 5), and also from the north or "Mud Pond" branch of the same stream (No. 6).

The analytical results are appended.

At the time of taking the samples the temperature of the air was about zero, and had not been very much above that point during the previous three weeks.

I was informed that the ground was frozen to a depth of over five feet, there having been little or no protection by snow.

Although the streams at the points of sampling were very rapid, we had to cut through a foot of ice to reach the water, and in one place we found the stream frozen to the bottom for some distance towards the centre.

In appearance No. 6 had a trifle less color than No. 5; both had a slight yellow tint.

Judged by the analytical results, No. 6 is practically the same as No. 5, and they are both better than any of the four samples collected in November last.

The great difference between the present Poestenkill samples and those previously taken, as shown by the analysis, is to be accounted for by the arrest of much of the swamp drainage by reason of the recent great and prolonged frost.

Very respectfully,

WILLIAM P. MASON.

ANALYSIS OF WATER

From north branch of Poestenkill ("Mud Pond" branch), No. 6. Sample taken Jan. 14th, 1893.

RESULTS IN PARTS PER MILLION.

Free ammonia	.0800
Albuminoid ammonia	.1150
Chlorine	2.0
Nitrogen in nitrates	trace
Nitogen in nitrites	none
Oxygen required to oxidize organic matter at 212° F	7.0
Total solids	40.0

From east branch of Poestenkill. Sample No. 5. Sample taken January 14th, 1893.

RESULTS IN PARTS PER MILLION.

Free ammonia	.055
Albuminoid ammonia	.117
Chlorine	1.9
Nitrogen in nitrates	trace
Nitrogen in nitrites	none
Oxygen required to oxidize organic matter at 212° F	6.6
Total solids	47.5

TABLE SHOWING CAPACITIES AND COST OF DAMS AT STORAGE SITES.

ITEMS.	QUACKENKILL.														POESTENKILL.							
	Site No. 1.		Site No. 2.		Site No. 4.		Site No. 4.		White Lily.		Long Pond.		Shaver Pond.		Simmons.		Ives's Corners.		Columbia.		Cottrell.	
	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.
Acreage Flowed	Diverting dam.		Diverting dam.		100		58		38.2		105.5		46.3		61.8		150		Diverting.		42.4	
Capacity, gallons					707,000,000		288,157,500		205,653,000		400,000,000		281,000,000		217,000,000		850,000,000				197,000,000	
Embankment																						
Earth					Cubic Yds., 125,000	$37,500	Cubic Yds., 27,000	$9,400	Cubic Yds., 30,629	$9,200			Cubic Yds., 30,000	$9,000	Cubic Yds., 28,300	$9,900	Cubic Yds., 122,000	$36,600	Cubic Yds., 7,200	$2,160	Cubic Yds., 23,000	$6,900
Puddle					13,250	14,600							1,200	1,420	800	880	15,000	16,500	400	440		
1st Class Masonry	200	$5,000	400	$10,000																		
2nd Class Masonry	2,080	$15,640	800	6,400															2,000	24,000		
3rd Class Masonry					4,600	24,200	2,300	11,500	3,480	17,400					3,000	15,000					2,400	12,000
Paving					Square Yds., 14,667	22,000	Square Yds., 2,500	3,750	Square Yds., 2,900	4,050			Square Yds., 1,334	2,000	Square Yds., 3,750	5,620	Square Yds., 17,500	28,250	Square Yds., 1,330	2,000	Square Yds., 1,500	2,250
Sodding					14,800	3,700	2,400	600	2,800	700			1,600	400	4,000	1,000	17,500	4,400	1,200	300	2,000	500
Gate House		3,000		4,000		12,000		10,000		7,500				5,000		8,000		10,000		3,000		6,000
Spill-way						17,600		15,000		750						30,000		19,200				6,800
Excavation																						
Earth, cubic yds	2,000	700	600	210					1,954	400											2,100	630
Rock, cubic yds	300	450	100	125	5,000	7,500	400	800							200	300	2,000	2,500	400	500		
Muck, cubic yds				700	20,000	8,000	20,000	8,000	37,000	11,100			20,500	8,200	4,000	1,600	46,700	18,700			17,000	6,800
Clearing, acres				100		2,400		2,400		2,000						500		2,000				1,000
Highway						2,000		2,000														
Totals		$24,790		$21,535		$151,500		$63,450		$53,100		$5,000		$26,020		$72,800		$138,150		$32,400		42,880